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ROOKLYN BOTANIC GARDEN RECORD

Plants & Gardens

GARDENING IN CONTAINERS

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1958

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NEW SERIES
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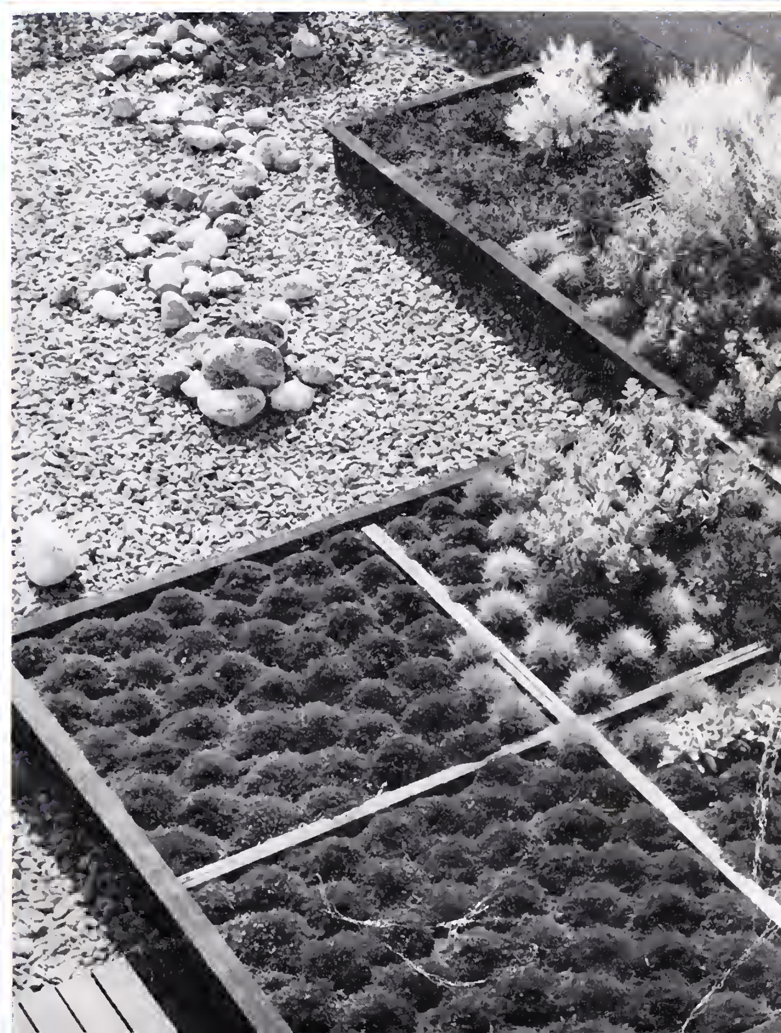

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LANTS & GARDENS

Vol. 14 Spring, 1958 No. 1

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Editorial

Henry Teuscher, *Guest Editor*
Peter K. Nelson, *Associate Editor*
and the Editorial Committee of the Brooklyn Botanic Garden

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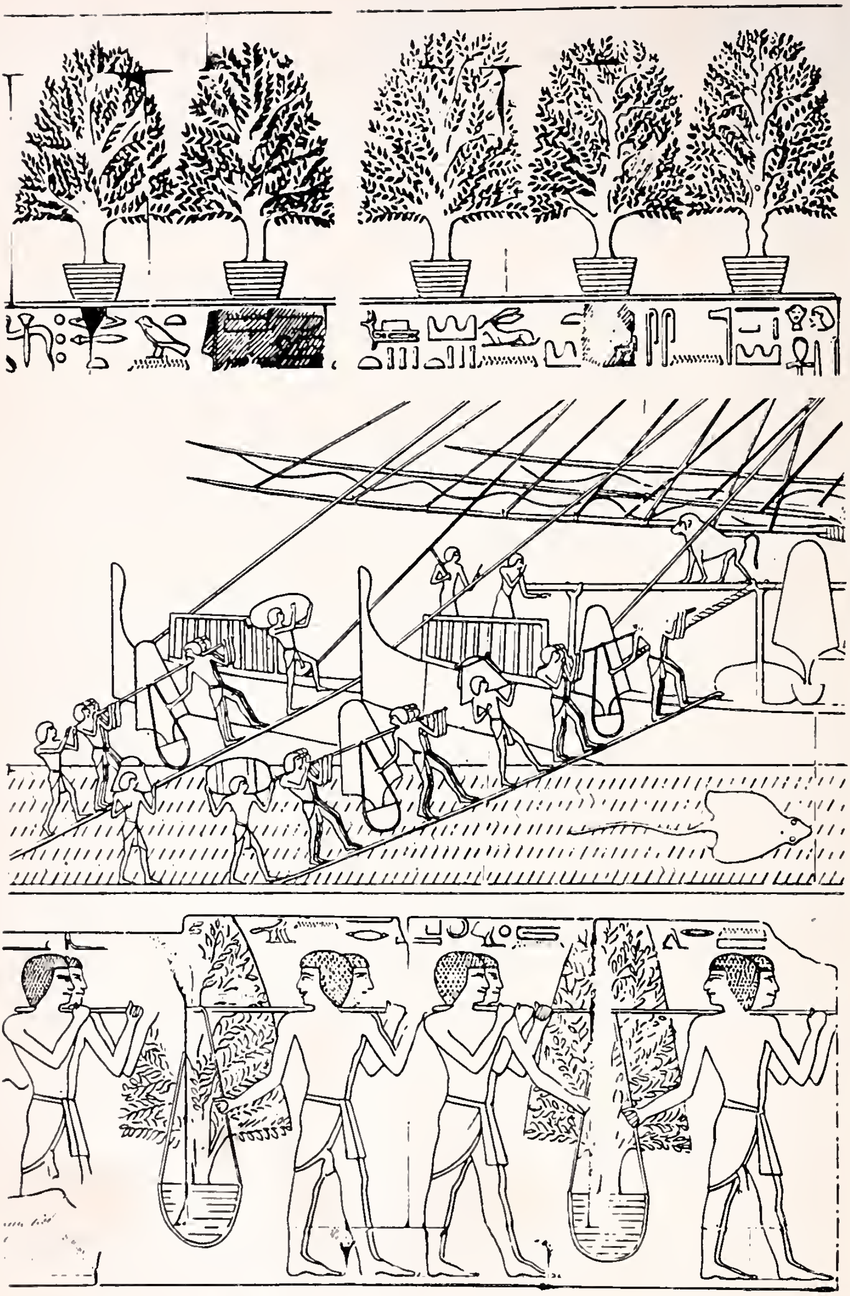

Gardening in containers is only a modern application of an ancient practice. These scenes, carved on the limestone walls of an Egyptian temple at Deir el-Bahri about 3500 years ago show frankincense trees in containers. Here they are being loaded on a boat for transport to Egypt from what is probably now the coast of Somaliland. (*From Naville, 1913*)

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
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A few years ago many merchants along Fifth Avenue were in vigorous disagreement with certain others in New York City who wanted a tree-lined avenue. Trees seemed to be so permanent, yet so expendable, so large, so expensive, and too inviting to pigeons. How simple it might have been had someone championed the growing of modest-sized trees in containers! There might even have been flowering trees. Enterprising nurserymen could have contracted to provide for their transportation and care, and perhaps change them two or three times during the season.

There are many shopping streets in the nation that need "dressing up." This can be accomplished easily by the use of plants in suitable containers.

Traffic congestion in several cities has led to the building of underground parking garages. On top of some of these, imaginative landscape architects have put beautiful container-gardens on a grand scale: witness San Francisco's Union Square, or Mellon Square Park in Pittsburgh. In some cities (Vancouver, British Columbia, is one) hanging baskets lend considerable charm. The point is that there are many situations where the future beauty and fame of a city or town might hang on some such developments as these. Page civic associations, service clubs and chambers of commerce. Imagination has put many a place on the map!

Container gardening has even more to offer the amateur, right at home. There are often circumstances which make it difficult if not impossible to garden in the usual way. For these, container gardening offers novel and often practical solutions. There is almost unlimited flexibility when one gardens in containers, whether it be in a favorite window box, on a roof top, at the seashore, or in a small city garden. Contemporary architecture has brought us more home terraces and sun decks, and apartment buildings with balconies. Container-grown plants offer great possibilities in all such settings.

There are dozens of suggestions in the pages that follow, some of them sure to be useful (or adaptable) to your special situation. Just as plants are interestingly different, so should be the containers in which they are grown. Don't fail to read the articles on miniature gardens—and on "vertical gardening." The latter is an idea, originally from Switzerland, I understand, that will be new to most Americans. Then there is special counsel for nurserymen who grow and sell their plants in cans — also for the customers who buy them.

It has been the feeling of our Editorial Committee for some years that time was ripening for the Botanic Garden to publish this handbook on GROWING PLANTS IN CONTAINERS. When Henry Teuscher's book on window-box gardening appeared last year (see p. 13), we knew he was the man to edit it. The authors he so carefully selected have measured up to his high standards and to those of this Garden. It has been a pleasure to work with them all.

Sincerely yours,

George S. Avery jr.

Director

THE ROOF GARDEN

Containers and knowing how to grow plants in them are the basis of any roof garden. Here an experienced landscape architect outlines fundamental principles

Vol. Lapins

ANY fair-sized house with a flat roof can support a roof garden, and this possibility should be considered wherever insufficient garden space at ground level is available or where a roof garden is likely to provide greater privacy or to offer better views. On the roofs of high buildings in the centers of cities, roof gardens play a particularly important role, since they provide a place for rest and relaxation where it is most needed. In any case, one must not overlook the importance of giving the landscape architect and the building architect a chance to get together before the design of the building is completed since, otherwise, many opportunities for best possible development are almost sure to be lost.

For any real roof garden development which includes more than a few movable boxes, it is definitely advisable to consult a landscape architect with previous experience in roof gardening. The experimenting of a gardener without such special experience can become very costly over a period of time. In addition, a roof garden offers exceptional scope for original ideas in decoration, and the landscape architect serves there in the same capacity as the ever more frequently employed interior decorator does in the home. That proper and correct planning will lower maintenance costs should be considered also.

Additional Weight On Roof

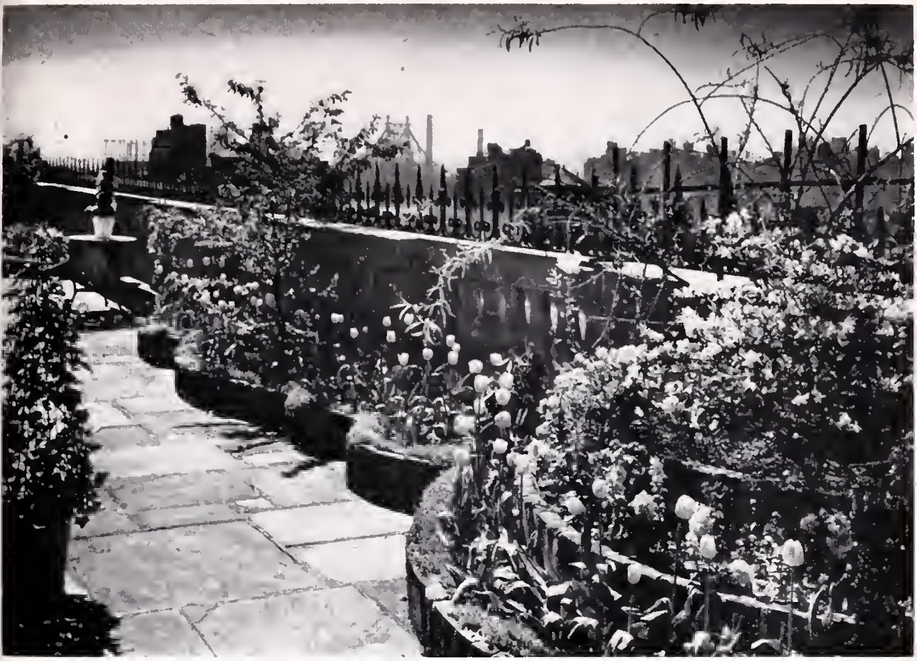
For a full-fledged roof garden with built-in plant areas of concrete or masonry, the additional weight must, of course, be taken care of through proper reinforcing of the roof slab as well as of the supporting substructures. However, even on a normally constructed flat roof, it is well possible to develop very charming garden corners by means of portable plant boxes. In northern regions, roofs always are built strong enough to support a certain amount of snow, so that during summer the additional weight of plant boxes is not significant. But in winter, when soil-filled and rain-soaked plant boxes are left on the roof—as most people will do in order to save labor—considerable extra weight will be added which may cause trouble. It will then be necessary to consult the building architect in order to establish where exactly the supporting beams and walls are, so that all plant boxes can be moved directly over them during winter.

Disposal of Drainage Water

The necessity of making sure that all plant containers used in a roof garden are constructed in such a manner that soil, leaves, twigs, etc., cannot be washed into the drainage system of the roof itself, must not be overlooked. Otherwise, clogging of the drains will unavoidably result, which may cause extensive damage and costly repairs.

Irrigation of Roof Garden

Free exposure causes, of course, a high rate of evaporation in a roof garden, and the provision of convenient means for watering the plants becomes very important. One or several water outlets with hose connection represent the simplest solution, but for the irrigation of an elaborate roof garden, one should consider the installation of a permanent irrigation sys-

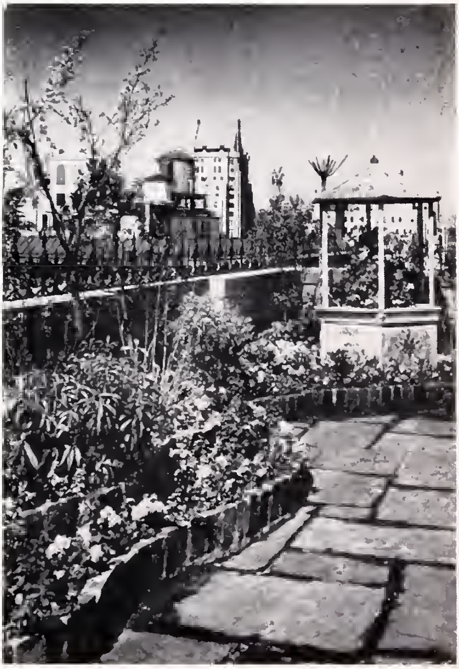


With adequate wind protection and proper exposure, tulips, azaleas and flowering crab-apples bring early spring bloom to this roof garden. Diminutive terrace effect helps the illusion of width as well as height.

tem. Perforated plastic pipes laid at proper distances and buried 6 to 8 inches below soil level in the deeper planted areas work very satisfactorily, provided that the water pressure is carefully adjusted. The latter must be high enough to force the water out of the pipe openings but not so high that the soil is disturbed. An overhead sprinkling system, dispersing a very fine spray, may be used also, and this at the same time will provide cooling on hot days.

Wind Protection

It is evident that a roof garden is much more exposed to wind than a ground-level garden. Increased evaporation with resulting rapid dessication, mechanical injury to the soft young leaves of growing



Same garden as above. A simple structure of proper proportions adds interest as well as perspective. Note drainage openings in edging wall.

Gottscho-Schleisner photos

The robust growth of common privet makes it a good hedge plant for the roof garden
The vine-covered arch accentuates the feeling of length of the terrace.

plants and impaired general usefulness of a very windy roof garden are the consequences. Carefully calculated wind protection, therefore, is an absolute necessity. Naturally, it is undesirable to enclose all four sides solidly with a wall or fence. Not only would this shut off all views, but it would also create a dead air spac which would overheat in the sun. On completely wind-sheltered corner will always be an asset, since it prolongs the usefulness of the roof garden into the coole periods of fall and spring. Otherwise only the windiest side should be fully pro

Gottscho-Schleisner photos

The use of simple planting boxes and tubs makes possible this summer garden of petunias on a back-roof. Slat decking protects the roof beneath.

ected. If more shelter is needed, one or wo additional sides or parts of them may e protected by means of ornamental vooden fences built of louvered boards. Such a fence breaks and "combs" the vind without excluding the passage of air. limbing plants find support on any type f fence and can greatly contribute to the verall beauty of the roof garden.

Sun Protection

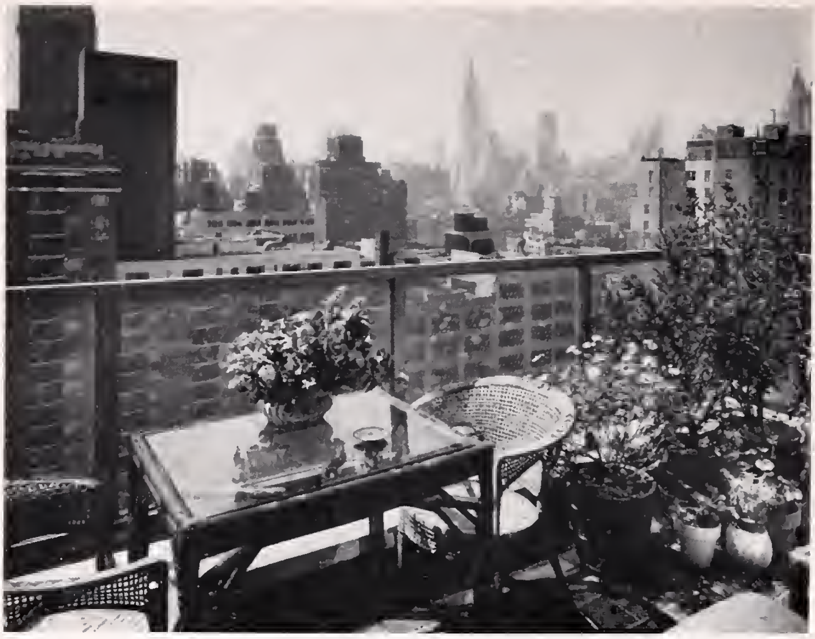
Full sunshine can be very intense on a roof and by overheating the whole roof surface may not only become objectionble to those who wish to enjoy the roof arden but will create also very difficult onditions for the plants. Strategically placed pergolas and arbors which distribute their shade where most needed can be f very great help to man and plants like. All portable plant containers in full sun should be set on blocks so that the ir can move under them. Areas of the roof, not required for walking, may be overed with colored gravel which by neans of dividing laths can be arranged n pleasing color patterns. Sprinkling the raveled areas with water will produce ooling through evaporation.

Smoke and Ventilator Fumes

There can be no doubt that smoke from any source whatsoever — for instance, from an apartment house incinerator—or fumes from ventilators must not be allowed to blow across the roof garden, not only because of their unpleasantness but also because of their harmful effect on the plants. This once more emphasizes the importance of considering the possible development of a roof garden before the house is built. Careful consideration of prevailing wind direction in the construction of chimneys, complete combustion in whatever furnace is used and the proper placement of ventilators supply the answer to this problem.

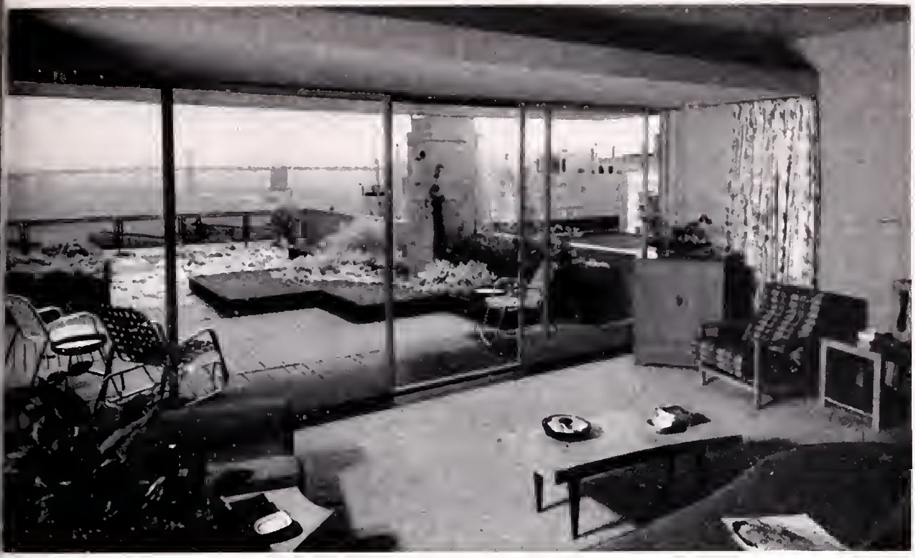
Plant Containers for Roof Garden

Boxes which are meant to be moved about in order to change their grouping should not be too large and should be built of wood, not of metal (see "Gardening in Window Boxes," page 13). Such boxes in themselves can be attractive in shape and may be rendered very ornamental through proper treatment of the wood, bringing out the natural beauty of the



Non-shatterable glass window-screen and a few plants for decoration make this small roof terrace a pleasant spot for a few hours in the morning and again in early evening.

Gottscho-Schleisner



. *Halprin, L. A.* *Braun*

his glass-walled living room and roof garden overlooking San Francisco Bay have several oteworthy points: shallow planting boxes and the use of gravel and stone, together with lants selected for their seashore ''feeling,'' give this setting a near-the-beach atmosphere.

rain. Permanent planting areas of large oof gardens may be, of course, of any ize or shape and can be constructed of oncrete or masonry, but their depth hould be limited to the absolutely reuired minimum in order to reduce weight. ertain shallow-rooting ground cover lants, such as some of the sedums, are atisfied with as little as 3 inches in soil epth. Annuals require a minimum of to 8 inches and shrubs 10 to 12 or 14 nches. Planted vases (see page 46), anging baskets (see page 54) and plantd moss-walls (see page 20) offer wonerful opportunities for the ornamentaion of a roof garden. To a wind-shelter ence, boxes of window-box size may be ttached at various heights, so that, deending on their location, they are at the ye-level of a sitting or a standing person.

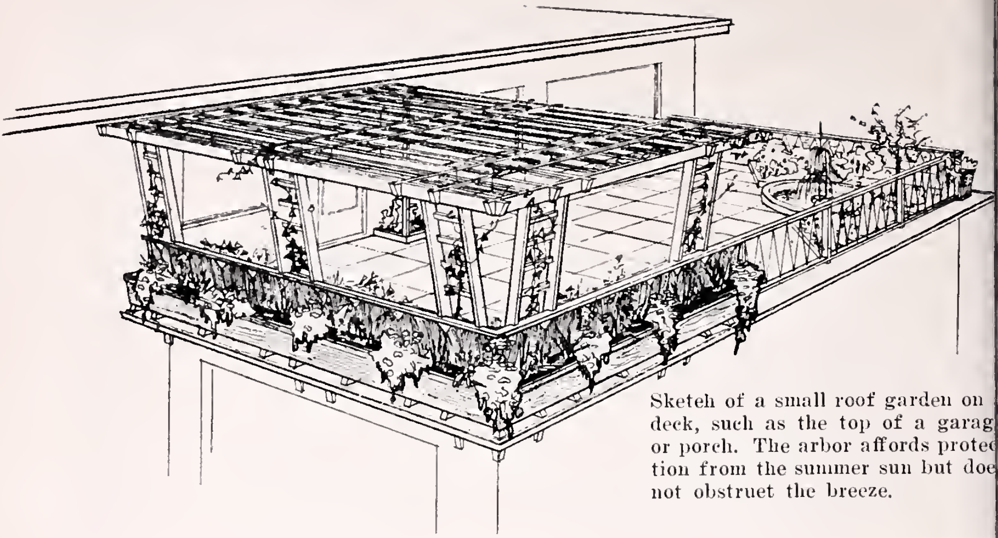
Soil Heating in Roof Garden

Under intermediate climatic conditions, vhere winters are not too severe but vhere relatively long periods of temperaure below freezing point are still the ule, moderate soil heating by means of electric cables coupled with automatic winter irrigation is very much worth considering in a roof garden. This applies in particular to regions where many types of conifers succeed well in the garden without winter covering. On the roof and in comparatively shallow soil these same varieties are likely to be killed in winter through the solid freezing of their root balls which prevents a steady supply of water to their evergreen and, therefore, continuously transpiring foliage. This results in complete dessication and death, even when the temperature never drops down to zero.

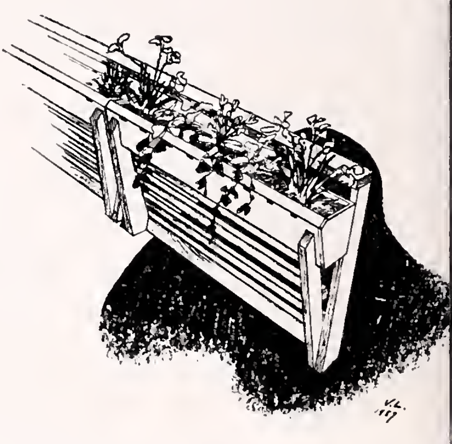
Moderate soil heating with automatic winter watering brings the evergreen roof garden with all its pleasures within the reach of many who may have believed this to be quite impossible of achievement.

Water in the Roof Garden

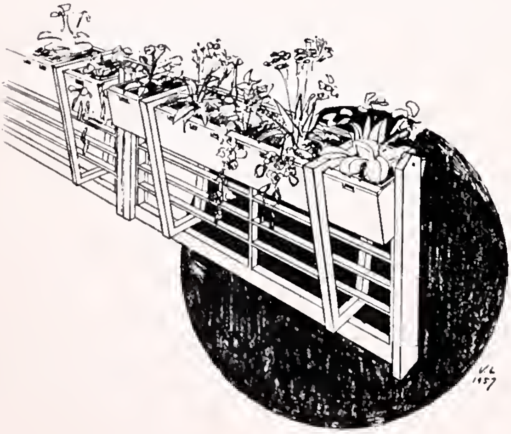
A pool, small or medium-size, is always a feature of great attraction, no matter whether it serves merely as a reflecting mirror for the surrounding plants and the sky with its clouds or to accommodate a



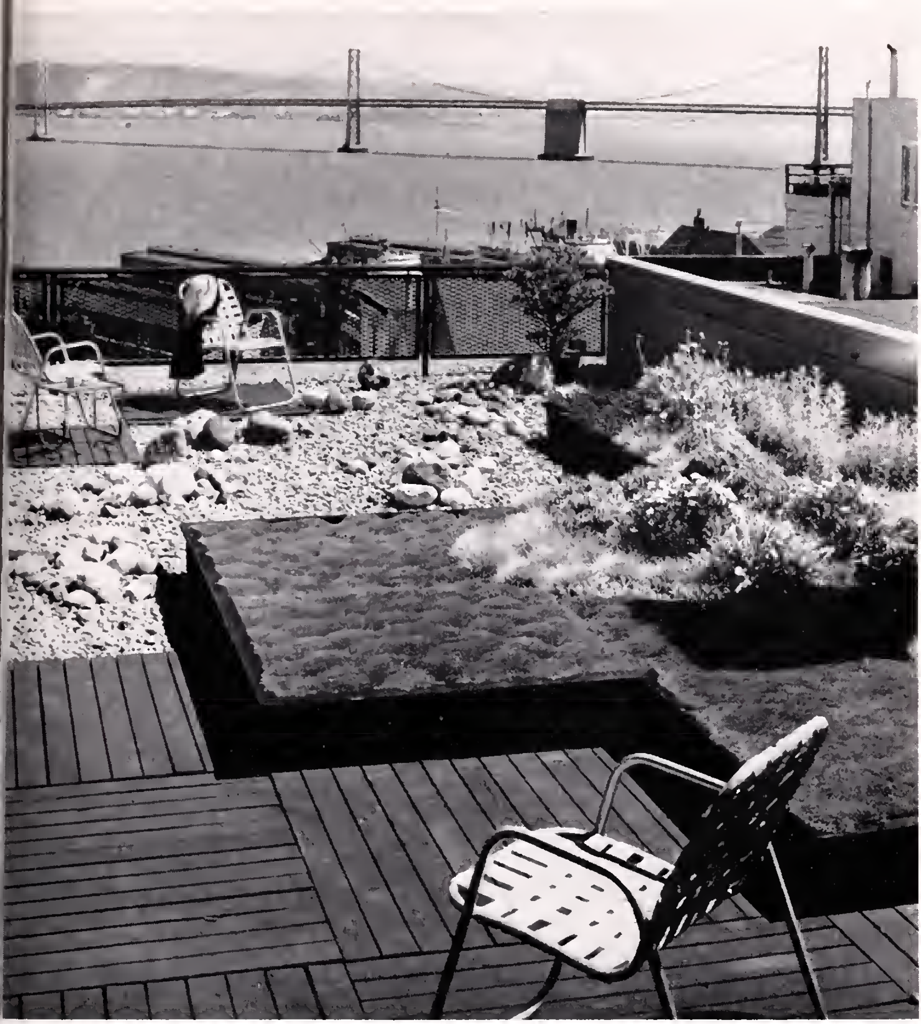
Sketch of a small roof garden on deck, such as the top of a garag or porch. The arbor affords protec tion from the summer sun but doe not obstruct the breeze.



These two ornamental wooden flower boxes are especially designed for roof gardens or terraces, where they may also serve as space dividers or fences.



Designs and drawings, courtes of the author, Mr. Vol. Lapin Landscape Architect.



., Halprin, L. A. *Braun*

Closeup of seaside roof garden shown on page 9.

ew waterlilies and other water plants. Wherever possible it should be included n the roof garden. A concrete pool would be expensive as well as heavy and night not even be durable on the roof. Iowever, several types of plastic skins re now available which offer wonderful pportunities. Not only do they remain stretchable, which means that such a pool can be left full of water over winter and does not crack even if it freezes solid, but in the roof garden they can be stretched over a wooden frame, rendering the pool construction very inexpensive. In addition, they readily permit the creation of any desired irregular shape. Nor is there any difficulty in equipping such a pool with a fountain, operated by means of a small motor with pump. If desired, the fountain can be illuminated with built-in lights, either white or automatically changing in all the colors of the rainbow. The water for such a fountain comes from the pool itself and continues to circulate.

HINTS FOR GROWING PLANTS IN CONTAINERS

For growing plants in containers, watering and drainage are two of the most important considerations. In general, plants in containers dry out more quickly than do those in open ground, so more frequent watering may be necessary, especially in dry weather. On the other hand, if insufficient drainage is provided, plants in containers easily become waterlogged, and this is perhaps more often a cause of failure than is drying out.

Drainage

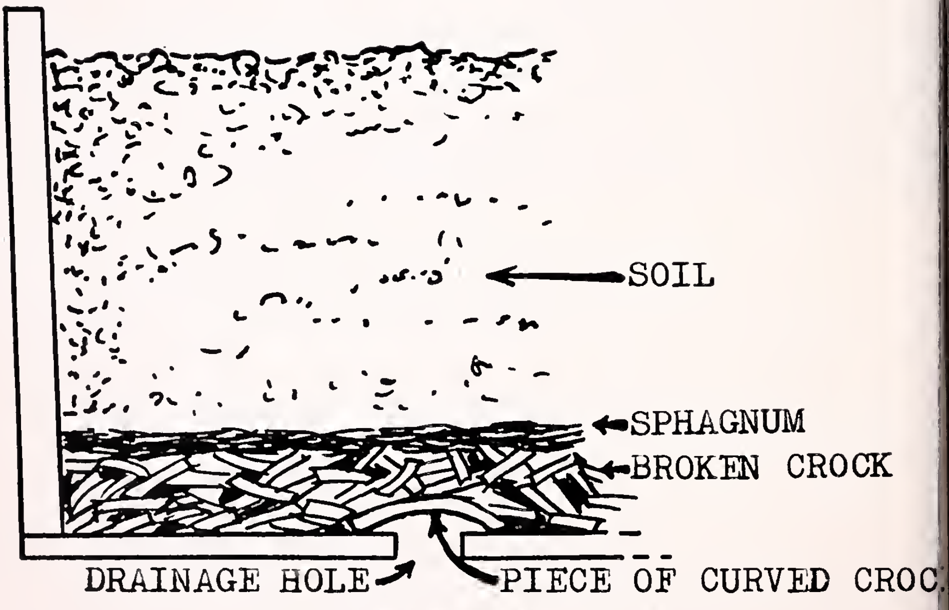
Needless to say, any containers that are to be used for growing plants for any length of time should have adequate openings in the bottom to allow for drainage. When filling the containers with soil, these openings may be covered with a curved piece of broken flower pot or with a piece of aluminum or plastic mesh. Over the bottom of the container is then placed an inch or so of bits of broken pot, cinders (cleaned of powdery ash) or similar material. On the drainage material it is advisable to spread a thin layer o sphagnum moss, coarse leaf mold, or even for large containers, straw. This laye prevents soil from washing down an clogging the spaces between the pieces o crock or cinders. The soil is placed directly on the sphagnum.

Soil

Some plants, such as succulents o heaths, need special kinds of soil if the are to grow well but most plants are surprisingly tolerant and can be grown i containers in any reasonably good garde soil. In general, light soils are better tha heavy ones. The following mixture is good general purpose soil for containers

4 parts soil
2 parts sand
2 parts leaf mold or peat moss
1 part dried cow manure
½ cup of bone meal to one pailfu
(2½ gallons) of the mixture.

For another satisfactory soil mixture se page 14.



Arrangement of soil and drainage material in container for growing plants.

Gottscho-Schleisner

GARDENING IN WINDOW BOXES

How best to succeed with this popular kind of gardening in containers

Henry Teuscher

HOW did I myself become a convert to this type of plant culture? Let me onfess it. As a matter of fact and, perhaps, to my shame, I did not take up window-box gardening of my own choice but was rather forced to do so when, over 15 years ago, I was asked to take charge of a city-wide window box competition ponsored by the City of Montreal. Like most other horticulturists, I had until then considered the growing of plants in window boxes as a very minor effort and had paid little attention to it. Now, when called upon to give directions and guidance, I discovered to my surprise that not only was there very much more to it than I had ever realized before but also that next to no good literature on the subject existed. What I could find consisted mosty of scattered articles, usually written by amateurs who had never investigated all the inherent possibilities. Therefore, I set out on a series of systematic experiments with the object of establishing the surest and easiest ways to success as well as of solving all the special problems involved. I soon discovered that many such special problems existed, and the experiments which have continued to this day finally crystallized into a book: WINDOW-BOX GARDENING which was published last year by the Macmillan Company of New York.*

Basic Principles

Naturally, it is not possible to condense a whole book into a short article, and those who want more detailed information must be referred to this book. However, the principles which assure success with an ordinary window box are rather simple and can be summed up as follows:

The box should be neither too small nor too large: 3 to 4 feet long, 8 to 10 inches wide and 8 inches deep are the most satisfactory measurements.

It should be made of wood, not of metal

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* Available at bookstores or from the Macmillan Company, 60 Fifth Avenue, New York, N. Y. $3.95.

Meloc

With vigorously growing plants, the mass use of window-boxes brings garden color to t flat stucco walls of this house.

which is likely to overheat in the sun. The boards of pine, cedar or redwood should be 1 inch thick to provide insulation as well as stability. Screws must be used to hold the boards together, not nails which are likely to be pulled out by warping boards, and brass screws which do not rust are safer than iron ones.

The bottom board of the box must be provided with two rows of ½- to ¾-inch-wide holes, about 5 inches apart from each other, in order to assure free drainage.

A coat of quick-drying paint will help in preserving the wood. This should be applied inside as well as outside, though the outside of the box will require two or even three coats of paint for a perfect finish. The inside of the box should be wiped with a wet cloth after the paint is dry, in order to remove all possibly present water-soluble residues which might be harmful to the plants.*

Crocks, potsherds or aluminum or plastic screening are then placed over the drainage holes to prevent their clogging, and a 1 to 1½-inches-thick drainage lay of leached, broken-up hard coal cinde or of broken brick should be filled in ov the bottom of the box. Bean-size or sligh ly larger is the size to which either cinde or bricks should be reduced, and all smal er particles, especially all dust or co ashes, must be sifted out.

A good and easily prepared soil mi ture for the window box consists of: parts of good loamy garden soil, 2 par peat moss and 1 part sharp sand. For flower box of the above dimensions, o 4-inch flowerpotful of bonemeal and ha that quantity of dehydrated sheep manu should be added, and all these ingredien must be thoroughly mixed as well as mo erately moistened before being introduce into the box.

The plants are set out either in ro or in groups, depending upon the effe one aims to achieve. The tallest plan are placed in the rear, in the center, on both sides. Medium high plants shou occupy an intermediate position a hanging ones should be placed in fro The distance between plants should from 5 to 8 inches, center to center lant, depending upon the type of plant sed. Rampant-growing varieties of pe- nias, for instance, should be spaced 8 ches apart, while sweet alyssums can be lanted as close as 5 inches apart.

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*At Brooklyn Botanic Garden satisfactory results have been obtained with Cuprinol.

The best time to water a flower box is the evening, and each watering must e so thorough that the water runs out at e bottom. After the first 4 or 5 weeks, complete fertilizer, dissolved in water t the rate of one teaspoonful per gallon f water (not stronger), should be ap- lied once a week. This must not be omit- d, or the increasing root competition the box will cause the plants to deteri- rate prematurely.

These simple instructions cover the ain principles one has to observe, but s stated before, there is a great deal more o it, and the ambitious windox-box fan ho will not for long be satisfied with he ubiquitous petunias and geraniums ill soon discover this.

Suitable Plants

In the first place, the choice of suitable lant material is very wide, much wider han most people realize. The limited space available here does not permit even partial enumeration. However, it may be stated that anybody can readily change the types of plants grown in the window box every year without repetition as long as he lives and never come even near to exhausting the possibilities. Nor is there any place on the outside of a window, no matter how unfavorable its exposure, where a number of plants can not be made to live happily in a window box.

And how about spring-flowering bulbs, such as tulips, hyacinths and others? These can easily be accommodated also if removable insert metal trays are built which fit into the window box. A 4-foot-long box may be equipped with two 2-foot-long metal trays of approximately the same width and depth as the outer wooden box. Into these trays the bulbs are planted in fall, and the trays are buried in the garden over winter. In spring, when the first shoots of the bulbs show above ground, the trays are taken up and placed in the window box where the bulbs flower. When they are through, the trays are once more removed to the garden and the bulbs are allowed to go to rest, though

Geraniums, petunias and wandering Jew are among the many sure-to-be-successful window-box plants.

Roche

they must be watered regularly as long as their leaves are green. Towards the end of August or in early September, the trays are emptied, and the best of the bulbs—there will now be more than before—are replanted in fresh soil. With this the routine starts over again and can be continued for many years without any need of buying new bulbs.

Roses, especially dwarf, long-flowering floribunda roses, or late-summer-flowering cushion chrysanthemums can likewise b grown in the window box for many years if insert trays, permitting one to win

SUGGESTED WINDOW-BOX PLANTS FOR VARIOUS EXPOSURES

For Full Sun

African daisy (*Dimorphotheca aurantiaca*)
Ageratum
Annual phlox (*Phlox drummondi*)
Geranium (*Pelargonium hortorum* vars.)
Marigold (*Tagetes* vars.)
Nasturtium (*Tropaeolum majus*)
Petunia
Scarlet sage (*Salvia splendens*)
Snapdragon (*Antirrhinum majus* vars.)
Sweet alyssum (*Lobularia maritima*)

For Light Shade

Basket grass (*Oplismenus compositus*)
Cupflower (*Nierembergia* spp.)
Desert bluebell (*Phacelia campanularia*)
Italian bellflower (*Campanula isophylla*)
Perpetual begonia (*Begonia semperflorens*)
Torenia (*Torenia fournieri compacta*)

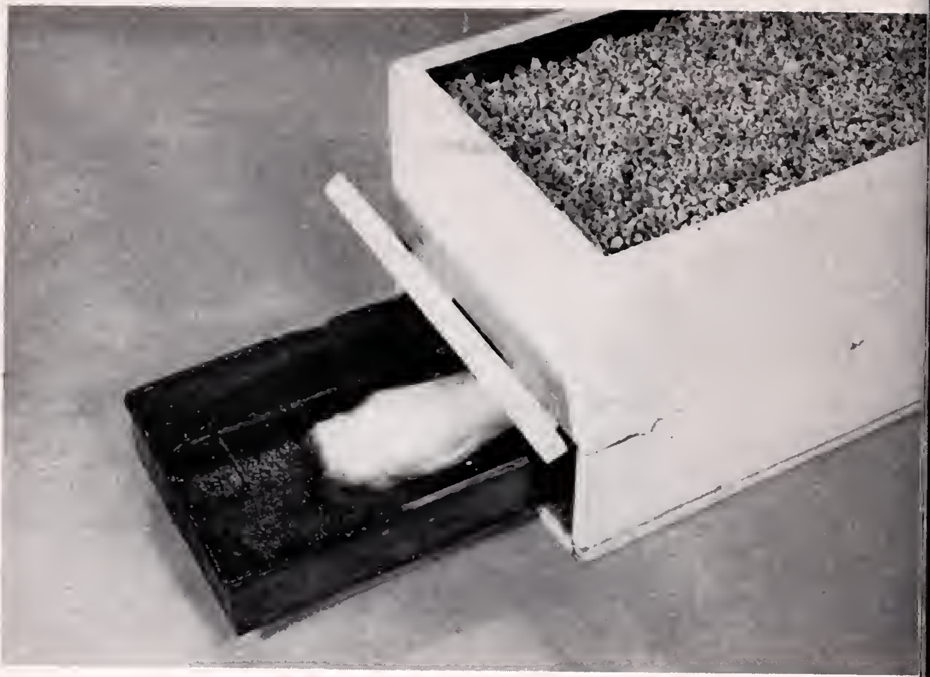
For Northern Exposures

(Little sun, but not too dense shade)

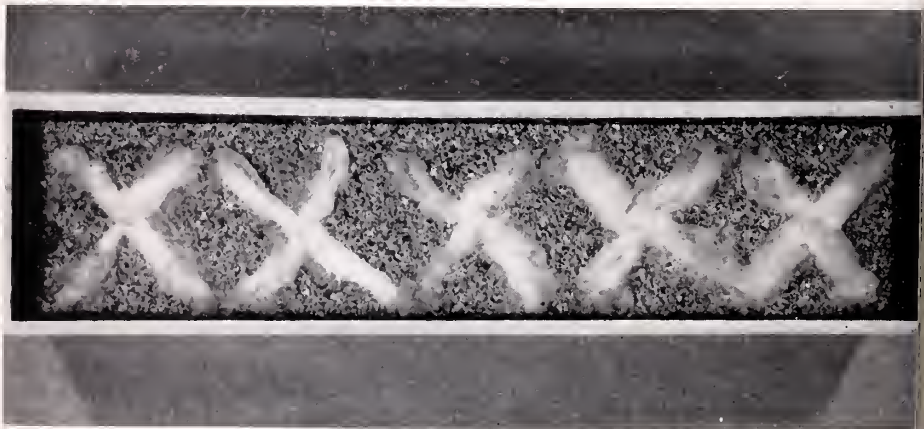
Basket grass (*Oplismenus compositus*)
Coleus
Creeping Jenny (*Lysimachia nummularia*)
Fuchsia
Hanging tuberous begonia (*Begonia lloydi*)
Kenilworth-ivy (*Cymbalaria muralis*)
Periwinkle (*Vinca minor*)
Perpetual begonia (*Begonia semperflorens*)
Tuberous begonia

Vindow-box plantings nside the grills soften he severe lines of this rnamental ironwork.
Gantner

Simple window ledge use of geraniums in pots.
Roche



Self-watering window box, showing metal tray in lower compartment with wick of gla wool; vermiculite in upper compartment.



Photos author courte

Looking down on bottom of upper compartment. Each glass wick is spread out into branches after coming up through hole in bottom of compartment. About 1 inch of v miculite is under the spreading wicks. Once the wicks are so arranged, the upper co partment is filled with vermiculite.

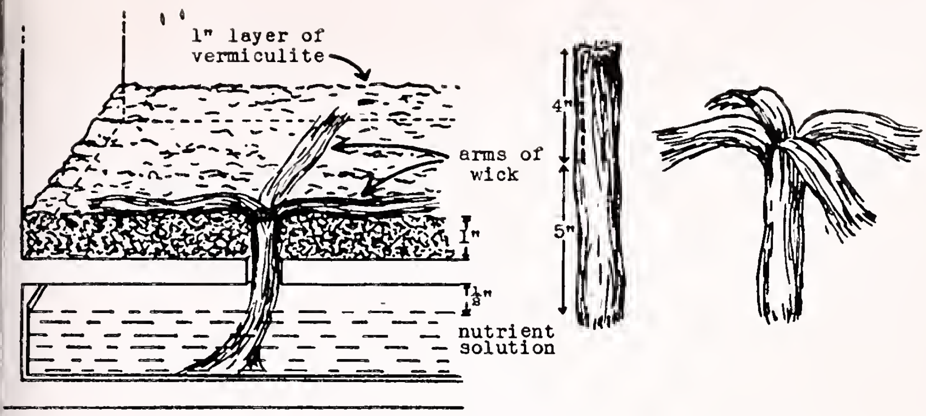


Diagram of self-watering window box. Drawing at right shows how 9-inch wick of glass wool is split to have four 4-inch arms.

ter the plants in the garden, are used. Left over winter in the window box, roses as well as chrysanthemums and spring-flowering bulbs would be killed.

There are all sorts of other possibilties which have sustained my interest in this fascinating pastime undiminished over all these years and have furnished me with ample material for a book.

Self-Watering Window Box

One development which may yet be mentioned is the soilless or self-watering window box. This has a double bottom, with the lower compartment holding a metal tray which contains a fertilizer solution. The upper compartment is filled with vermiculite into which the plants are set out with their root balls intact. The fertilizer solution moves upward by means of glass-wool wicks which connect the two compartments. This box, which anybody with a little experience in carpentry can readily build himself, takes care of the two main objections which may be voiced against window boxes, namely, that they unavoidably drip dirty water and that many people like to go away over the weekends, which spells doom to their window-box plants.

The self-watering window box cannot drip because the water moves up instead of down, while the water reservoir in its lower compartment permits leaving it unattended for 4 or 5 days. There is only one point in the routine care of this box which may trip up the amateur. The fertilizer solution used in the tray of the lower compartment must be prepared at the rate of one level teaspoonful per gallon of water. If this amount, which seems very small to many people, is doubled or the solution is made still stronger—as was done in a case which has lately come to my attention—the plants are stunted, due to an over-high concentration of salts, and flowering is very poor.

A rather drab board fence can be converted into a perpendicular flower garden.

VERTICAL GARDENS (MOSS-AND PEAT-WALLS)*

From Switzerland comes a new and exciting way to grow plants in containers of sphagnum or peat

Norbert Schindler

THE very unusual type of plant container which is described here had its inception in 1944 when the seed house G. R. Vatter, Bern, Switzerland, decorated the facade of its store with columns of sphagnum moss, covered with flowering plants. This first demonstration of a new method of plant culture created a great deal of interest throughout Western Europe, and imitations soon commenced to appear everywhere.

A Kind of Hydroponics

Actually, this represented merely an ingenious new application of the well known principles of hydroponics, the growing o plants in chemical nutrient solutions. Th original procedure consisted in raisin plants over tanks which were filled wit liquid nutrients. The plants were supported by wire-mesh, while their root were suspended in the liquid. Late gravel or other inert mineral materials a well as sphagnum moss or coarse pea were also used to support the plants, an the beds then were flooded with the nutr ent solution—which was drained off sub sequently—in time-controlled intervals.

Both sphagnum moss and peat have very high water-holding capacity (8 to 1 times their own weight) and are able t hold and to store nutrients. In additio hey are highly buffered, which means that hey offer strong resistance to a change in heir reaction (their pH). In consequence, ven long time watering with alkaline, ime-containing water hardly affects them, nd an over-concentration of salts through ver-feeding is much less likely to cause rouble than with other growing media.

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*Translated from the German by H. T.

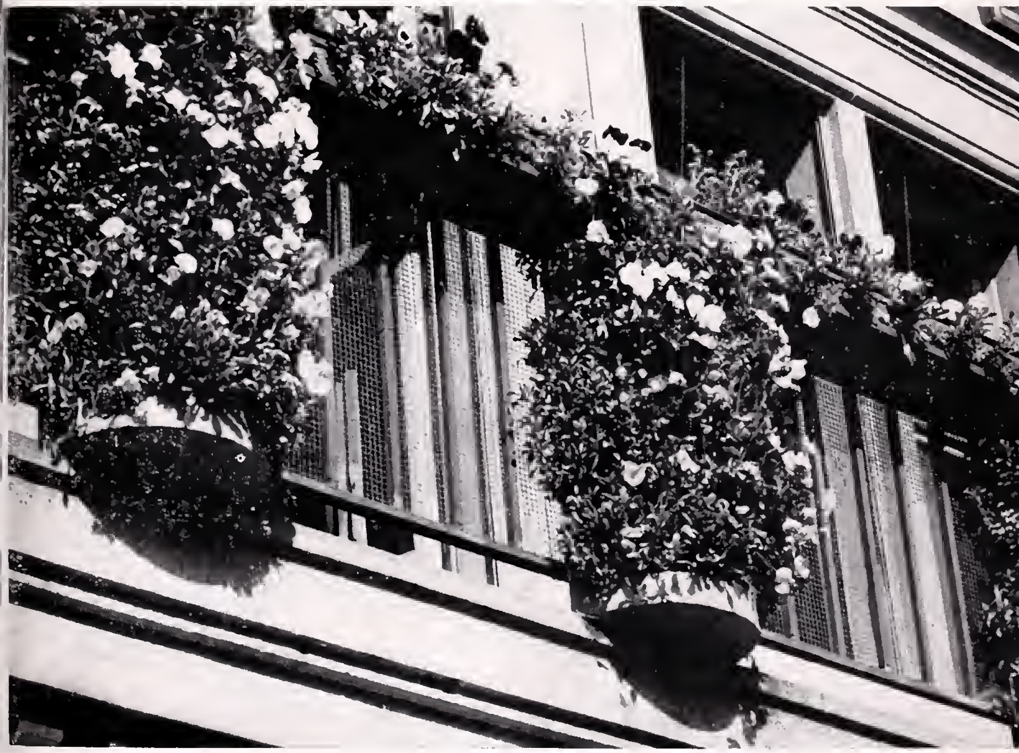
The horizontal hydroponic bed of phagnum moss or peat, stood upright so hat its planted surface is vertical, is the noss- or peat-wall to which the Swiss ave introduced us.

Many Possibilities Presented

The new possibilities which this development opens to the plant- and flower-over are wide and wonderful. Ugly features of the immediate surroundings can readily be hidden with a minimum loss of room. Intimate places to sit and rest, assuring absolute privacy, can be created quickly even where space is limited, for instance on a balcony or in a small roof garden. Season-long flower decorations in all conceivable shapes can easily be attached to and maintained on the outside of commercial or official buildings. A wide field of experimentation presents itself to the imaginative decorator as well as to the venturesome plant lover.

Construction

The first step in the preparations for growing plants vertically in a moss- or peat-wall is the construction of a skeleton box of the desired dimension and shape. This container serves to hold the



Photos courtesy Vatter Seed Co

"Living" pillars adorn the facade of this building in Switzerland.

moss or peat in place and may be built with ribs and corners of wooden laths, bamboo or metal rods. The actual walls of this box consist of wire-mesh (chicken-wire) with a mesh width of approximately $2\frac{1}{2}$ inches. Of the various shapes which may be fashioned, the easiest to describe in detail is the simple, quadrangular wall. This may be built either directly against a building wall or to stand free. In the latter case it can be planted on both sides and may even be equipped with wheels to permit moving it about. How solid and stable the skeleton box has to be depends, of course, upon its dimensions, and it is evident that a free-standing wall, and especially one which is movable, must be built more strongly than one which is supported by a wall behind it. The wire mesh has to be prevented from bulging out through inside wire braces, and in a high wall it may even be necessary to install several horizontal wire-mesh partitions in order to prevent the fill-material from settling too much.

A wall which is to be planted on one side only need be no more than 6 to 8 inches thick but should have a solid rear wall, preferably of laminated wood. If it is fastened to the wall of a building or set up directly against it, the outside surface of the rear wall of the box must also be insulated by means of roofing paper. A free-standing wall which is to be planted on both sides has to be 10 to 12 inches thick.

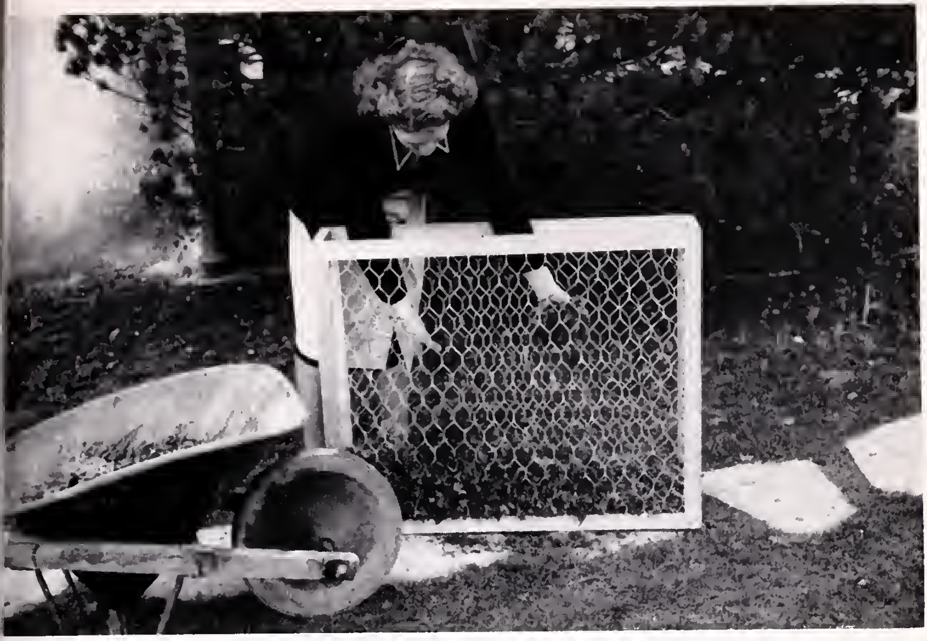
The bottom of the box, except when it rests on the soil—when gravel may be put under it—should be closed and must be reasonably solid. This is particularly important, when the bottom is raised 4 to 6 or even 8 inches above the floor, as is usually done.

All wooden parts have to be impregnated with a non-poisonous preservative, and the metal parts also have to be protected not only against rusting from water but most of all against the corrosive action of fertilizers. (Liquid plastic which can be applied to both wood and metal is likely to prove particularly useful for this purpose. H. T.) Where water and fertilizers cannot be permitted to run on the floor, a water-tight tray has to be placed under the planted wall.

The filling of the skeleton box with the rooting medium has to be carried out with considerable care. If sphagnum moss is used—which is highly suitable—it is of importance that this material be first thoroughly loosened up, either by hand or machine, and be evenly moistened. No tight, dry lumps must be permitted to remain. The moss then is packed firmly into the box by introducing it in layers, and the corners in particular have to be tightly stuffed with moss. The bracing cross-wires have to be respected in this operation, and one must make sure that they are not loosened.

Where sphagnum moss is not readily available, peat may be used, provided that fibrous peat as well as coarse agricultura peat can be obtained. The rough, fibrous peat is needed towards the outside, against the wire-mesh. When applied in a 1-inch thick layer, it serves to prevent the finer peat moss from trickling out. The center of the box, behind the fibrous peat, is filled with a mixture of granulated pea moss and coarse agricultural peat (the grade used as stable litter). Granulated peat moss alone would settle down too tightly. Peat also has to be moistened evenly before it is used. It has the advantage over sphagnum moss that it i much easier to fill it into the box and to achieve an even packing with it. Nor doe it have to be packed as firmly as sphagnum moss.

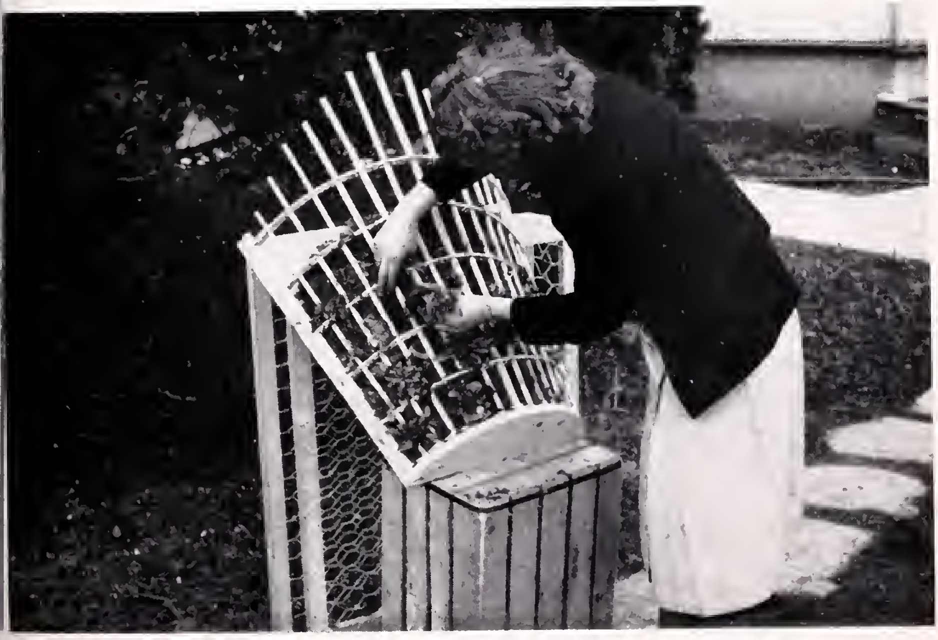
Many interesting facts concerning th actions and usage of peat have bee brought to light and publicized in numerous papers by the Peat Exploration Company, Ltd. of Zwischenahn, Germany Their impressive demonstration, consisting in a peat-flower-house, was one of th highlights of the National Garden Show at Hanover in 1951. This small, thoug full-sized house with a steep gable-roo was completely covered with a layer o fibrous peat and was planted all over wit thousands of flowering plants. Only th



Filling a wire-mesh box with sphagnum moss, preliminary to its almost magic transition into a vertical garden.

Planting pansies in a wall basket previously filled with sphagnum moss.

Photos courtesy Vatter Seed Co



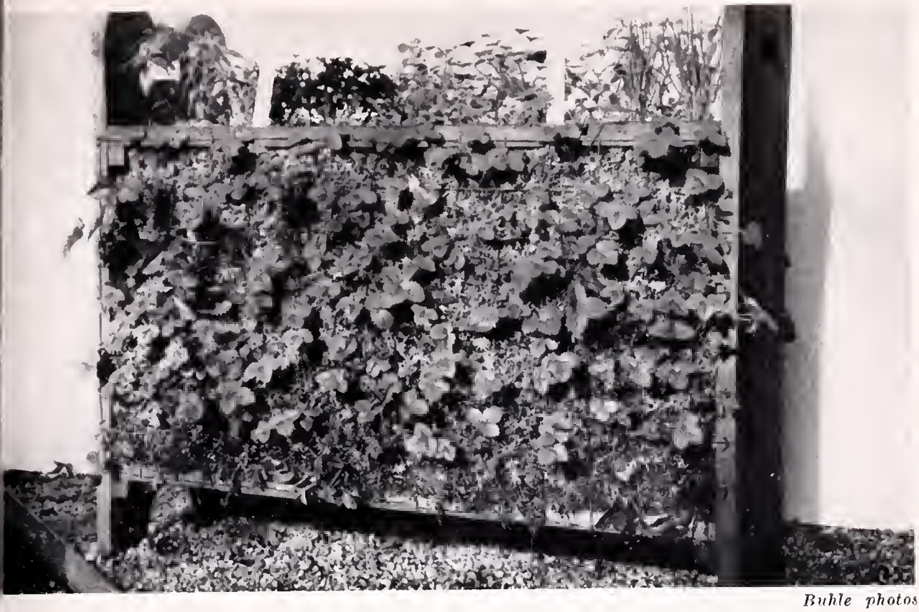
A great many plants are required, even in this shallow wire-mesh container.

Rooted or unrooted cuttings of English ivy thrive in sphagnum culture.

door and window openings were left free It was a beautiful sight and a great attraction for many months, the plants remaining in vigorous growth and continuing to flower freely.

Planting

The planting of a vertical wall is somewhat more tedious than that of a horizontal bed because it requires more care As far as possible, one should use plant with small pot-balls which were raised i either sphagnum moss or peat. A planting hole is opened with the fingers throug a mesh of the wire, and the pot-ball of th plant is pressed into it. Rather dee planting is advisable, and the plant itsel should slant slightly upwards. Bulbs ca be planted in the same manner. Thoroug watering after planting must not be forgotten, the water to be applied with hose equipped with a sprinkling rose from above as well as from the open sides Freshly planted walls must at first be protected against sun and wind. After abou one week the plants are sufficiently roote to be able to stand full exposure.



Buhle photos

Portable strawberry "wall" with small collection of kitchen herbs growing on top.

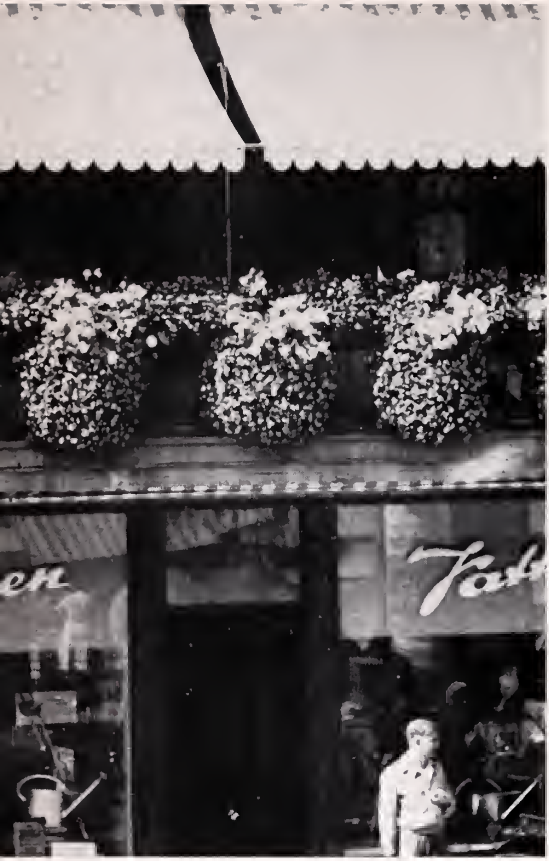
The **number of plants** required is rath-
: large. With *Begonia semperflorens,*
or instance, one will need 50 plants per
quare yard, if they are planted at a dis-
ance of 5 x 5 inches. If planted 4 x 4
nches, 80 plants are needed for the same
rea. Such close planting is necessary,
ecause the plants do not spread as much
ideways as they do in a horizontal bed,
vhile gaps between them are more no-
iceable.

Watering has to be regulated accord-
ng to the thickness of the wall, the
veather and the types of plants used. In
ool, rainy or cloudy weather, daily water-
ng is unnecessary, but care must be taken
hat the whole wall is always evenly moist
hroughout. The simplest procedure is to
ise a soil-soaker, a porous hose common-
y employed in the watering of hedges.
This may be buried about 1 inch deep
along the top of the wall so that it can
readily be connected with a water tap by
neans of an ordinary hose. The water is
allowed to run, until the first drops ap-
pear at the bottom of the wall.

Feeding commences about a week after

Vatter

Lettuce and spinach grow well in this vertical garden.



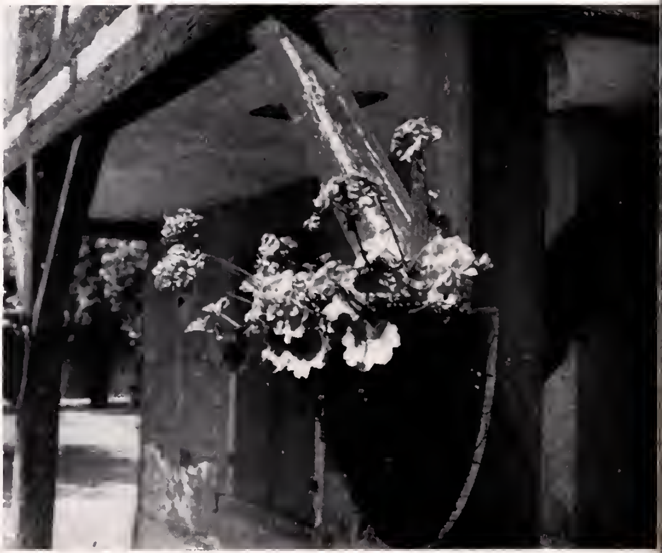
Facade of the Vatter Seed Store in Bern
Switzerland.

Vatter Seed Compa

planting, and with a moss-wall should b repeated regularly once a week thereafte A peat-wall requires feeding only onc every two weeks. The fertilizer used mus be absolutely complete—which means th all the trace elements must be include also—and the strength of the solutio must be carefully controlled. (The speci tablets mentioned by Mr. Fessler on pag 29 would undoubtedly be perfectly satis factory but, since rather large quantitie of solution are needed in this case, it wi be much cheaper to prepare the solutio directly from pure chemicals. In Ge many, this type of fertilizer is availab in ready-prepared mixtures. H. T.) A far as possible, a cloudy day should b chosen for the application of the nutrien solution, and the moss-wall should b moist before the fertilizer is applied. has been calculated that each cubic yar of moss filling absorbs 11 gallons of liqui at every once-weekly soaking with nutr ent solution. In 20 summer weeks th would amount to 220 gallons of solutio

Kinds of Plants to Use

Many kinds of plants may be used f the planting of moss- or peat-walls. Pa



This medieval building in Switzerland is decorated with plaques of flowers. The shield is of wood, and the sphagnum moss is held in place by wire mesh. Geraniums, petunias and begonias are used most successfully.

Gantner

ularly successful and long-lived have
en: ageratum, alternanthera, *Begonia*
nperflorens, small-flowered calceolarias,
tunias, aluminum plant (*Pilea cadierei*),
v small-flowered marigolds (*Tagetes*),
d pansies (*Viola tricolor*). Definitely
itable also are: bedding snapdragons
ntirrhinum), calendulas, sanvitalia, ver-
nas and low zinnias, as well as *Aspara-*
s sprengeri, coleus, *Impatiens sultani*,
arf fuchsias, dwarf, early-flowering
lvia splendens and wandering Jew
radescantia or *Zebrina*). Early flower-
g rock garden plants, such as alyssum,
abis, aubrieta and primula have given
od results also, and the spring-bloom-
g bulbs: crocus, hyacinth, grape hya-
nth (*Muscari*), narcissus, scilla and
lip have been equally good. However,
eir display season is rather short and,
hen they are gone, the wall has to be
planted. Not wholly satisfactory were:
ters, tuberous begonias, lobelias, neme-
ıs and *Phlox drummondi*.

Very interesting and amusing is a moss-
all planted with non-running, long-bear-
g strawberries, such as 'Baron Solem-
cher,' which can readily be raised from
eds. Kitchen herbs, such as parsley,
ives, basil, marjoram, savory and wa-
r-cress succeed very well also.

The frequent demonstrations of moss-
nd peat-wall culture by seedsmen and
rseries as well as by the peat industry
ave created a great deal of interest in
is novel procedure, but so far relatively
w amateurs have taken it up. The main
ason for this fact may be the rather
gh investment involved which results
om the construction of the skeleton box,
e large numbers of plants required and
e amounts of fill-material which have
be purchased. Inexperience in dealing
ith a nutrient solution as well as the not
ncommon distrust for such "artificial"
eatment may also be deterrents. How-
er, even if the average amateur remains
oof, the unexcelled opportunities for
ectacular display which this method of-
rs to the professional gardener will read-
y assure it a permanent place in hor-
culture.

Vatter Seed Company

A vertical garden wall may be used to give privacy on a small terrace.

Buhle

Pansies grow luxuriantly in a vertical "garden."

HOUSE PLANT CULTURE WITHOUT SOIL IN DOUBLE-POT CONTAINERS*

Albert Fessler

WATER culture (hydroponic culture) of pot plants has become very popular in Germany in recent years and, encouraged by excellent results, many plant lovers have converted their whole house plant culture to this method.

Particularly happy about this procedure are gardening amateurs whose business forces them to travel frequently. But also during a weekend absence or in vacation time hydroponic culture eliminates the necessity of having to ask a neighbor or a friend to take care of one's favorite house plants. When placed on the window sill in favorable light conditions, and when the temperature can be depended upon to remain reasonably stable, plants now can take care of themselves for a surprisingly long time, and one can be sure that they will suffer no harm whatsoever.

Wax plant (*Hoya carnosa*) grows well in hydroponic culture.

The modern hydro-culture-pot consists of two parts: the outer pot, usually of glazed ceramic; and the unglazed ceramic insert pot, which is perforated at the bottom. The two pots have to fit well into each other, of course, and both are supplied together as a set in varying sizes, shapes and colors.

Planting

Younger plants in full growth are best suited for planting in this type of container. All soil is carefully washed off the roots under running water, and the plant is introduced into the insert pot in such a manner that as many roots as possible hang out through the holes provided for this purpose. Care must, of course, be taken that no roots are broken. The insert pot then is filled with gravel, crushed pumice stone or other medium-coarse, inert, mineral material (crushed brick in pea-size pieces, or coarse perlite, etc., will probably be satisfactory also. Sand, being too fine, will not do, and vermiculite is not likely to be suitable either. H. T.) The insert with the plant in it is suspended in the outer container, and the latter is filled with nutrient solution. At the beginning the solution is filled in to the rim, so that the newly set-out plant can absorb it immediately. Later on, when root growth becomes more active, the nutrient solution is lowered by one or two inches, in order to give the roots better access to air which is important.

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*Translated from the German by H. T.

Fertilizers

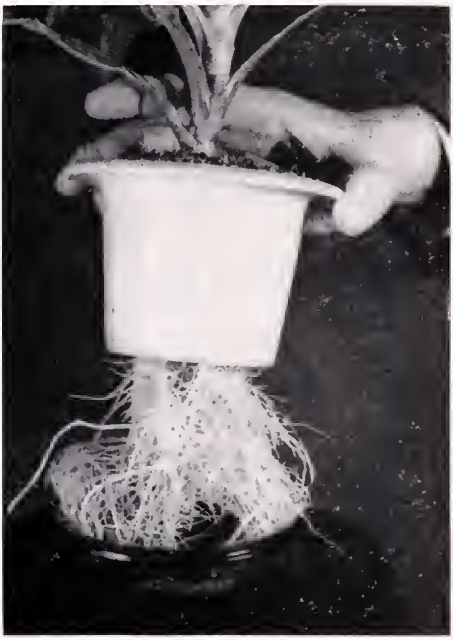
The nutrient supply problem has been solved for the amateur with special fertilizer tablets which in Germany are available at all garden supply stores, and which are sold in small vials of 20 tablets for D. M. 1.50 (approximately 35¢) per vial. These tablets contain all required plant nutrients,* except calcium, in readily soluble form and in a carefully worked-out balance. Calcium has been omitted because German tap-water generally contains it in sufficient amounts. (Where calcium is lacking, which means where the water is very soft, it can readily be supplied by adding a few drops of dissolved gypsum or land plaster (calcium sulfate) to the nutrient solution. H. T.) One tablet, dissolved in one litre (approximately 1¾ pint) of water, provides the recommended strength of the nutrient solution. To assure an adequate nutrient supply, the solution is completely renewed every 3 or 4 weeks. In between times, if the plants evaporate much water—for instance on hot days, in heated apartments or with large-leaved plants—only water is added to maintain the desired level: about 1½ inches below the rim. With correct dosage, one vial of 20 tablets is sufficient to keep one house plant in perfect health for one year.

The handsome, vase-shaped outer containers are glazed also on the inside which renders them completely non-porous. In consequence, they can safely be placed anywhere without a saucer and without danger of water-rings on expensive furniture. They are available also with one flat side which permits attaching them to a wall, as free-suspended vases in hanging-basket fashion, or in bowl shapes. Prices of ceramic hydro-culture-pots range in Germany from D. M. 5.- to 10.- ($1.25 to $2.50).

Hydro-culture-pots of glass also are of-

Dracena thrives under hydroponic culture, as evidenced by good top growth (above) as well as the mass of roots (below).

Author photos



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*Besides nitrogen, phosphorus and potassium these tablets, sold under the name "Planta Nova," contain 23 trace elements.

fered in the stores, and in these the root growth can be observed, of course, which intrigues the amateur. However, glass containers have the great disadvantage that they become quickly infested with algae. In consequence, the nutrient solution has to be changed every two weeks, the glasses have to be thoroughly cleaned just as frequently, and the roots have to be washed in running water. Opaque containers, therefore, are preferable.

Plants

All of the common house plants succeed extremely well in hydro-culture pots. Particularly satisfactory are all foliage plants, such as the rubber plant (*Ficus elastica*), the ceriman (*Monstera deliciosa*), all the numerous philodendrons and dieffenbachias, croton, cordyline, dracaena, pandanus, scindapsus, peperomia, English ivy (*Hedera helix*), etc. Even cacti and other succulents grow strongly and healthily in these pots. Among flowering plants, the handsome anthuriums, stephanotis, wax plant (*Hoya*), gardenia, flowering maple (*Abutilon*), African violets and numerous others have given perfect satisfaction. Short-lived plants, such as primulas, Christmas begonias, cyclamen and calceolarias are less suitable, and plants with a pronounced cycle of growth and rest, such as amaryllis, clivia, calla, caladium, etc., should be attempted only if they can be given proper care during their resting period.

Hydro-pot culture is well beyond the experimental stage in Germany and has become an established new method of treating plants in the home. Not only does it greatly simplify the keeping of house plants but a special bonus results from the fact that the thoroughly balanced nutrition which it provides seems to create in the plants a remarkable resistance to fungus and insect infestations.

* * *

NOTE ON FERTILIZERS

The fertilizer recommendations in the different articles are necessarily as varied as the practices and commercial products in the different countries in which the articles were written. For the convenience of readers in Canada and the United States, who have access to our products, the following commercial fertilizers may be mentioned: Agrico, available in several different proportions of nitrogen, phosphoric acid and potassium; Vigoro, 'Regular' or 'Golden.' In general, 1 to 2 level teaspoonfuls of the dry fertilizer should be dissolved in a gallon of water—for use in hydroponic solution.

For city dwellers who will need only small amounts of fertilizers, one or more of the following trade name preparations are available at most 10-cent stores, or drug- and hardware stores. Or, they may be ordered from Vaughan's Seed Company (24 Vesey Street, New York) or other seed and plant supply firms:

The numbers after the name indicate the percentage of available nitrogen, phosphorus and potassium in each fertilizer. Many preparations also include the minor elements.

Plantabbs—11-15-20
Plantrons—12-24-12
Ra-pid-gro—13-26-13
Hy-gro—13-26-13
Hyponex—7-16-19
Miracle-Gro—15-30-15

All fertilizers should be used according to manufacturers' directions. For example, for Hyponex or Hy-gro, dissolve ¼ teaspoonful of powder in 1 quart of water.

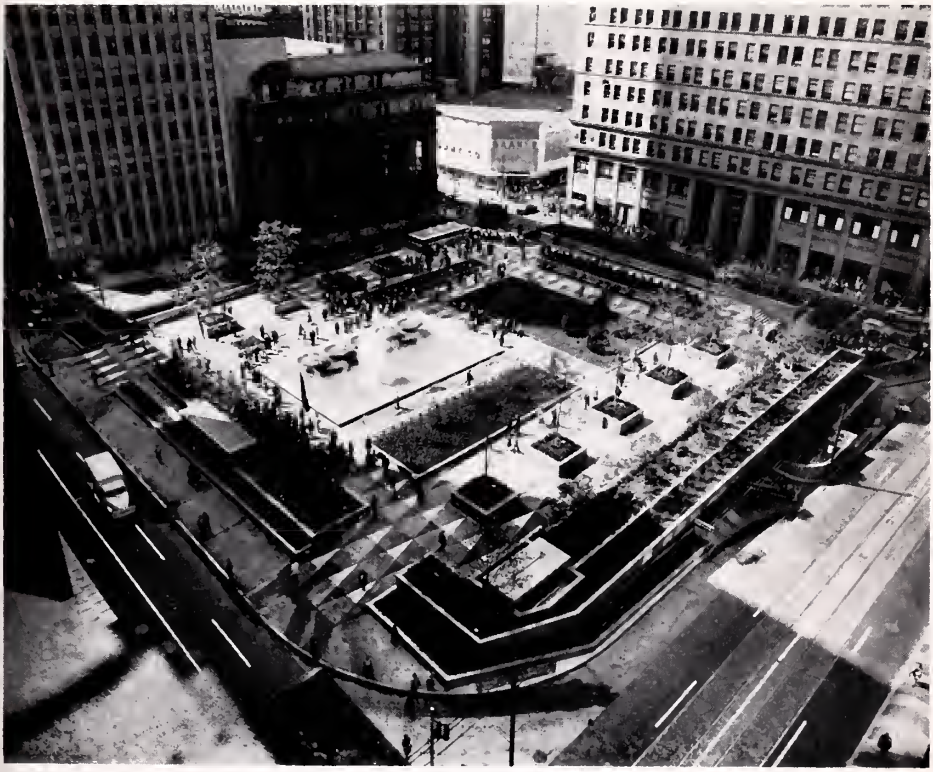
MELLON SQUARE PARK

is a park based on plants grown in containers

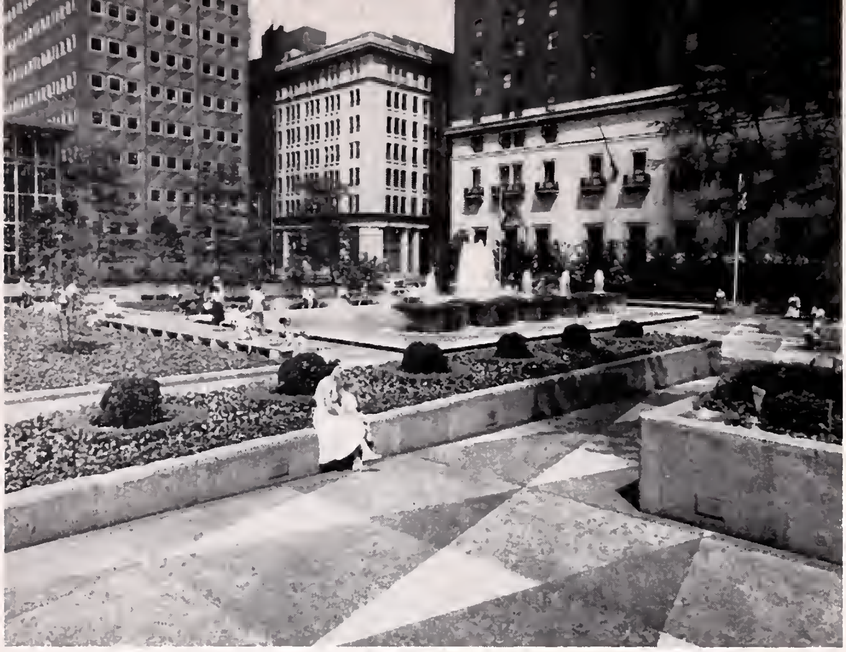
Frank Curto

MELLON Square Park is an excellent example of the use of plants grown in containers on a grand scale. At the same time, the park is a vivid demonstration of the ability of many plants to flourish under extremely adverse conditions.

The park, as the photographs indicate, is a completely elevated structure, 260 feet by 230 feet, or about 1⅜ acres. This landscaped roof shields one full block of stores on the north side and covers six underground floors of a parking garage capable of housing 1,000 cars. The roof is composed of 18 inches of construction materials applied in six layers: three layers of waterproofing; a layer of sand and gravel and cement fill; 4 inches of concrete with built-in snow melting system; and a final layer of rustic Venetian terrazzo. The polished marble granules of the terrazzo, in four colors, are laid between stainless steel screeds. The paving design depicts the Pittsburgh Triangle but



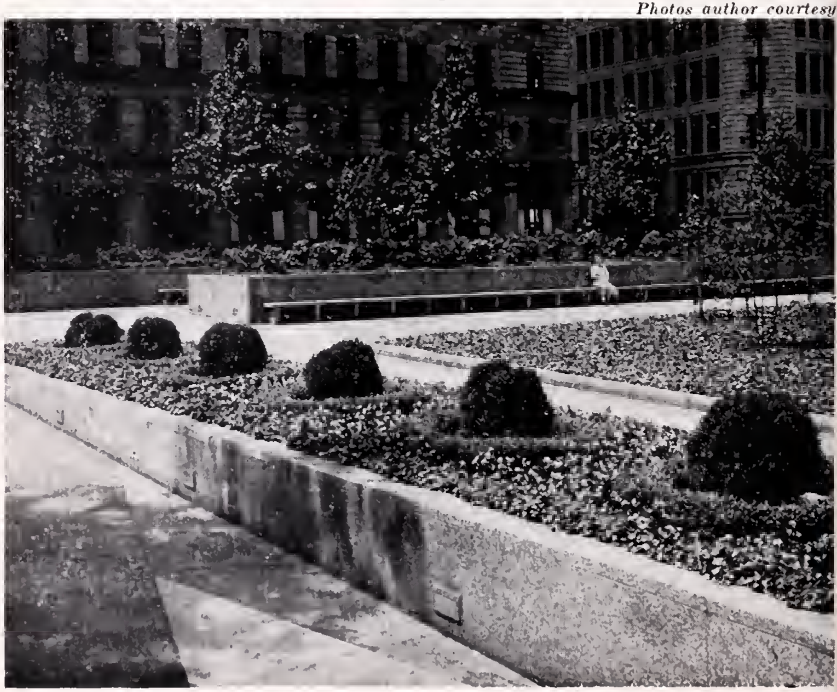
Aerial view of Mellon Square Park, Pittsburgh, Pennsylvania, atop six-floor underground parking garage and numerous stores.



In the foreground is a floral display box in which begonias constitute the main planting. Surrounding each of the specimen boxwoods is a ring of dwarf Japanese holly.

Foreground as above. Display box behind visitor is planted with Japanese pieris, under-planted with English ivy. Sweet gum trees in background. See list for other plants used.

Photos author courtesy



the triangles may be looked at also as large M's, commemorating the donors of the park, the Mellon family.

Built-in Containers

The plant containers, constructed of reinforced concrete, form an integral part of the concrete roof slab. All of the containers, including those cantilevered over openings and areaways, are faced and capped with polished Minnesota grey granite. Drainage lines and irrigation pipes as well as electrical conduits were installed in the planting boxes during their construction.

From the moment of the park's conception until its completion, the architects, landscape architects and the technical staff of the City of Pittsburgh's Department of Parks worked together as a team. Once the overall design was accepted, an immediate search was made to select, tag and reserve the plant material for the park. For this purpose, the landscape architect and the city's horticulturist visited various nurseries in Illinois, Ohio, Pennsylvania, New York, Virginia, New Jersey and Maryland and personally selected and tagged every plant which was to be used in the park. The landscape contractors had to base their bids for the job on the plants which had been selected and were not permitted to furnish plants of their own choice.

Planting Poses Many Problems

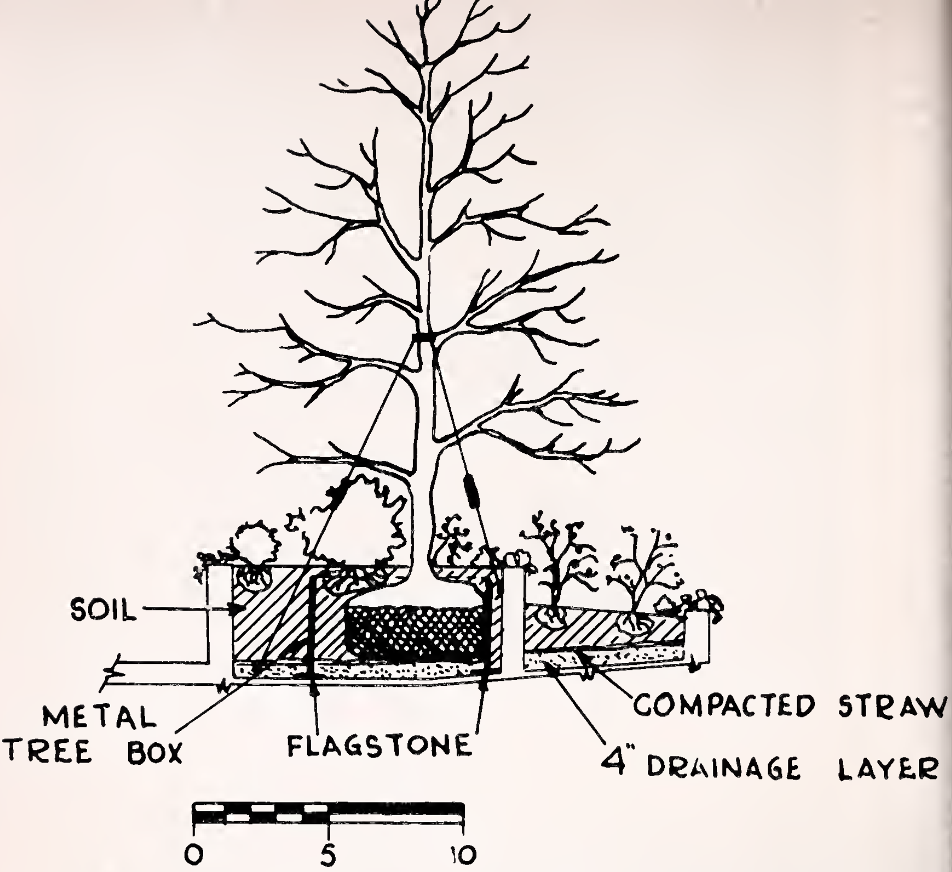
Choosing the plant material for the park was not an easy matter, because the plants not only had to fit the architectural picture and be in keeping with the overall design but had to be selected also for their resistance to the worst possible environmental conditions. In addition, the donor had stipulated that the park should have a "finished" appearance from the very beginning, which meant that only exceptionally well grown plants of fair size could be used.

Because of the park's location, the prevailing winds from the west are channeled down one of Pittsburgh's windiest streets. The wind, coming down a canyon of tall buildings, bursts into the open park area with a velocity which at times has been sufficient to break 1/4" steel cables guying the big trees.

Every effort was made in the design to vent the fumes from the thousands of automobiles which use the garage each day. These fumes are added to the general atmosphere surrounding the park, which already is polluted by the heavy vehicular traffic passing on the four streets bounding the park. An additional complication is the heating of the roof slab during the winter months, inasmuch as the floors beneath are heated, and heat is generated also by the snow melting lines built into the slab itself.

Another factor which had to be taken into consideration was light. Some of the planting boxes are situated so as to receive full sunlight throughout most of the day, while a certain portion of the same planting area is shaded most of the time. Since in many instances the same planting continues through both types of exposure, plants had to be chosen which tolerated both conditions equally well. The planting list shows the plant materials employed in the park. No changes in plant material have been made since the original planting. The first honey locust (*Gleditsia* sp.) was set in its container on the 7th of February 1955, and all planting was completed on the 10th of June 1955. The loss in plant material has been negligible, and the majority of the plants have done surprisingly well. Most of them have made growths comparable to that of the same kinds under normal conditions. One very small planting of English ivy adjacent to the garage entrance had to be removed after the first winter. The constant blast of warm air playing over the plants had killed them.

All of the flowering plants such as hybrid rhododendron, azaleas, pieris, pyracantha, viburnum, aronia, *Magnolia virginiana* and flowering crab-apple have budded and flowered very well through three growing seasons.



Sectional diagram of display box, showing relative depth of planting. (Scale in feet.)

The minimum depth of the shallowest planting area is 14 inches. These areas are planted with English ivy, one of several of Hahn's patented varieties. In a few areas, the same shallow depth is planted with trailing *Euonymus fortunei colorata* which has done exceptionally well. All other planting areas range in depth from 24 inches to 4 feet in which the large deciduous trees are planted. Except for the shallow areas, 6 inches of coarse gravel is provided for drainage. This has been fully adequate, since all of the beds drain perfectly. The drainage material was covered with a 4-inch compacted layer of clean straw to prevent the soil, composted mushroom soil, from being washed into the gravel. All the ericaceous plants were pocket-planted in oversize holes filled with pure Canadian peat moss.

Irrigation

An elaborate and rather expensive irrigation system had been installed in the park during its construction. This system consisted of a series of bubblers and sprinkler heads and was expected to provide complete and automatic watering of the plants. Unfortunately, it proved unsatisfactory from the very beginning. The bubblers which were supposed to flood the planting beds with water failed to do so because the water, instead of spreading out on the surface, ran down along the pipe risers. The sprinkler heads, while effective in certain areas, can be used only late at night when no one is in the park, because the frequently violent wind drifts the water spray over the paved areas. Fortunately, a sufficient number of hose connections had been included in the irrigation layout, permitting hand watering with reasonably short sections of hose. Since several of the long planting boxes do not dry out uniformly, parts of them remaining quite moist while other areas dry quickly, hand watering is unavoidable anyhow.

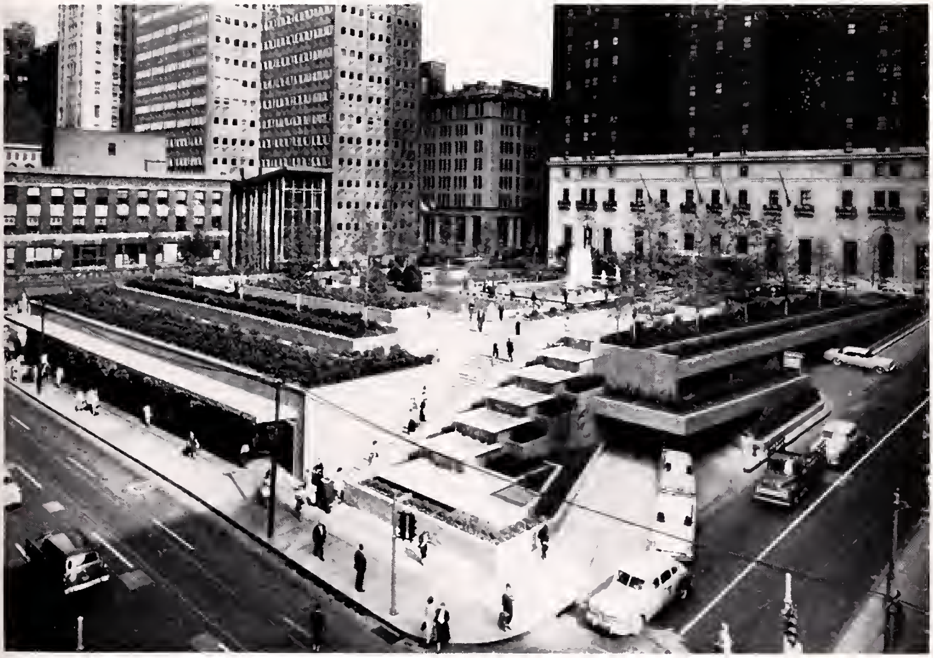
All of the planting areas in the park receive one application of dry complete fertilizer in early spring. This is followed by two applications of a complete liquid fertilizer, once during late spring and again in midsummer.

Pest Control

Though well removed from any other large plantings, insect pests have given the usual trouble. Bagworms have attacked the liquidambar and honey locust trees. Spider mites and scales have infested the azaleas, and aphids have been found on tips of the English ivy. Our spray program starts with a late winter spraying with an oil spray against scale, and this is followed by regular spraying with DDT and malathion. At the beginning of the bagworm season the trees are sprayed with arsenate of lead and malathion, combined with a spreader-sticker. This program has kept insects pretty well under control. Only the bagworms which infest the honey locust trees are still giving trouble. Despite weekly spray applications, it has never been possible to obtain uniform coverage with spray material of all the tiny leaflets and branch tips. When complete kill is not obtained through spraying, the live bagworms are hand picked wherever they are accessible.

Special Displays

Two large and two small planting boxes in the park are reserved for floral displays. These consist of the customary spring bulbs, followed by annuals and finally by chrysanthemums in mid-October. For the first two seasons a large variety of annual plants were tried in these areas in order to determine which would give the best results. We found that bedding begonias were most outstanding and



Oblique view of Mellon Square Park. Shops at lower left have mass plantings of azaleas on top. Lower right, entrance and exit to parking garage. Adjacent to steps are the cascade pools.

the best variety tried so far is 'Pink Profusion.' The second most effective plants have been the small-flowered bedding petunias.

One box is regularly planted with large tropical foliage material such as crotons, pandanus, acalyphas, beloperone, hibiscus and coleus. This same box is used for the Christmas tree display. It is fitted with heavy steel channel irons made as an "X" frame, permanently placed on the bottom of the box. The ends of the frame are fitted with steel rings to which guy lines are attached to support a 35- to 40-ft. Christmas tree. The large areas containing ground-cover plants are thickly planted with narcissus bulbs.

Winter Protection

Winter protection consists of spraying all plants with Wilt-Pruf. This material is applied to all of the plants in the park in early November, during a warm bright sunny day, using a power sprayer. We believe sincerely that the use of Wilt-Pruf has helped considerably to reduce the loss of plants from winter-kill.

Lighting

Most of the lighting for the park consists of spotlights with blue lenses which are recessed to ground level in the planted areas. Smaller lights are embedded low in the granite facing of the planter boxes to light the paved areas. An additional amount of light is supplied by the spotlights in the large pool and from lights concealed behind the waterfalls on the cascade pools. The only other light which enters the park is reflected light of street lamps across from the park. There are no light standards or poles within the park proper. The overall effect of the lighting is a soft but rather spectacular moonlight glow.

Visitors from all over the world have exclaimed over the beauty and utility of this park, which is considered to be one of the most outstanding examples of redevelopment in an urban area. Surrounded on all four sides by skyscraper-size buildings, the park is a cool and inviting oasis to the tired shopper, the harried executive and the multitude of workers who are employed in the downtown area.

PLANT LIST AT MELLON SQUARE PARK

Trees		**Height**
13	*Fagus sylvatica* (European beech)	12′-15′
2	*Franklinia alatamaha*	6′-7′
9	*Gleditsia triacanthos* (honey locust)	5″-6″ Cal.
7	*Magnolia virginiana*	8′-10′
1	*Malus baccata columnaris*	10′-12′
3	*Malus* 'Zumi'	7′-8′
1	*Malus purpurea eleyi*	12′-14′
5	*Pinus sylvestris wateriana* (Scotch pine var.)	8′
3	*Oxydendrum arboreum* (sourwood)	6′-8′
14	*Tilia cordata* (linden)	5″-6″ Cal.
5	*Liquidambar styraciflua* (sweet-gum)	4″-5″ Cal.
1	*Sophora japonica* (Japanese pagoda tree)	4″-5″ Cal.
Shrubs		
112	*Aronia arbutifolia brilliantissima*	3′ -4′
75	Azalea 'Gable Hybrid Orange'	24″-30″
96	Azalea 'Wilhelmina Vuyku'	24″-30″
48	*Rhododendron obtusum amoenum*	24″-30″
50	*Berberis julianae*	24″-30″
93	*Euonymus fortunei coloratus*	18″-24″
154	*Ilex crenata bullata*	18″-24″
165	*I. crenata* 'Stokesi'	15″
378	*I. crenata rotundifolia*	18″
48	*Ligustrum ibolium*	5′ -6′
15	*Pieris floribunda*	24″-30″
69	*Pieris japonica*	24″-30″
171	*Pyracantha coccinea lalandi*	7″ pots
20	*Rhododendron catawbiense* Hyb. Red.	3½′-4′
30	*R. catawbiense* 'Roseum Elegans'	3½′-4′
2	*R. catawbiense* 'Boursalt'	4′-5′
32	*Taxus media* 'Hicksi'	30″-36″
14	*Viburnum tomentosum* 'Mariesi'	3′ -4′
5	*Buxus sempervirens*	3′
Vines		
12,026	*Hedera helix* 'Hahn's Self Branching'	2½″ pots
6,037	*Hedera helix* 'Hahn's Maple Queen' (Pat.)	2½″ pots
2,522	*Hedera helix* 'Hahn's Green Ripple' (Pat.)	2½″ pots
1,756	*Hedera helix* 'Hahn's Shamrock' (Pat.)	2½″ pots
2,262	*Pachysandra terminalis*	2½″ pots

ORNAMENTAL PLANT CONTAINERS OF WOOD

Designed for beauty and permanence as well as function

Jean Van Petten

METHODS of culture for plants in containers are not within my field of competence, and I have no intention of suggesting any. I am still experimenting with them myself in amateur fashion and I gladly leave such advice to others. All I can say is that it is certainly wise to consult an expert on such details as soil, drainage requirements, root space needed, sun and shade plants, feeding schedules, etc.

We do not encroach on the horticulturists' field, however, when we insist that the boxes plants grow in can and should be designed for attractiveness as well as use. They should be designed for permanence and with an air of belonging to the house or terrace or porch where they are to be used. We call our boxes plant furniture.

Two years ago, on the hunt for a shallow redwood box for a miniature hemlock, we found we were limited to ready-made tubs or some unimaginative window boxes. Any deviation from these perennial favorites was quoted as "faddy," "arty," or "crazy," and not to be considered commercially. This was obviously the wrong approach.

A month later we owned three power saws, two sanders, drills, small tools and many feet of redwood and cypress with which to experiment. Wood has integrity in almost every outdoor setting. Redwood and cypress are not subject to soil rot and are ideal for outdoor use.

Two years of experimenting with design, construction, finishes and use have given us the principal answer to "Why can't we find an unusual and distinctive plant box for our terrace?" You can't find it because you haven't yet demanded it in volume and, consequently, would go into a state of shock at hearing the price.

All of us expect to pay astronomical prices for custom-made articles. Part of our willingness is pride of having something designed for our personal needs. We do not have the same pride in a ready-made article, and it costs just as much to produce in small quantities.

Koch

This cypress plant box, rubbed with linseed oil and turpentine, has integrity whether used indoors or out.

These hexagonal boxes of redwood can be used in many arrangements and combinations.

So far the retailers are right. An article is not commercially feasible until it can be produced in volume. We do not believe, however, that distinctive plant furniture is faddy or arty. Home owners simply have to be alerted to the possibilities of beauty in box gardening in greater numbers. When the demand is great enough the manufacturer can make a well-designed plant box at a fair price.

Possibilities in Box Gardening

There are limitless possibilities in box gardening and fine plant material now is obtainable at local nurseries.

The illusion of a sizable rose garden can be created with miniature roses in a succession of border terrace boxes. Potted azaleas, begonias, hybrid geraniums and varieties of tropical foliage plants can be sunk in boxes filled with peat moss and brought inside as house plants when freezing weather threatens.

Dwarf hedges are effective when boxed on a terrace surrounded by flower beds. A rather wide choice of low-growing plants suitable for this purpose is offered by nurseries. A number of cotoneasters, among them *C. adpressa, C. horizontalis* *C. microphylla* and its variety *thymifolia* are low-growing and small-leaved. They make fine plantings in wall or step boxes.

For early spring boxes, the small bulbs crocus, chionodoxa, snow-drop, eranthis etc., are readily available. Primroses (*Primula polyantha*) and grape hyacinth (*Muscari*) planted together make a step or door box garden that is all one needs for spring color if limited for space.

Hemerocallis in hundreds of new varieties of clear pinks, apricots, mauves

Koch photos

Different arrangement of boxes shown on opposite page. Indented bottom edge enhances appearance, and fits into tops of others, making possible "double-decking," as at rear.

yellows and dark reds, do well in boxes nd, chosen wisely, will give three months f bloom. Chrysanthemums are a natural (see photographs above). With our growing conditions, which include heavy soil and alternate freezing and thawing, the box-planting of chrysanthemums actually enhances the scope of our gardening. The planted boxes can be wintered, well mulched, in a protected spot, and divisions are readily made in March or April. Loss of the more tender hybrids may thus be avoided.

The Japanese hollies, *Ilex crenata convexa* and *I. crenata* 'Hetzi' are very effective when planted in boxes and placed on either side of a door.

Anyone interested in training miniature trees or bonsai which grow all their lives in pots and containers can derive both summer and winter pleasure from them. These fascinating trees follow the normal season of new growth, bloom, fruiting and dormancy depending upon the climate of the country in which they are indigenous.

Hints and Suggestions for Do-it-yourself Plant Container Fans

1. A basic design can be copied and, by the subtraction of a molding or addition of legs (see photographs page 40) changed to blend with contemporary or older homes.
2. Pick anybody's brains for knowledge of rules of design. The addition of an extra horizontal line (see photograph on page 41) will give a box for lower planting. The subtraction of as little as ¼ inch from overall

Above, porch box of simple design. Below, same box with fashioned legs.

height may make a considerable difference in the appearance of a container.

3. Redwood and cypress make the best outdoor boxes for reasons already stated. Pine, cedar or poplar are equally good woods for painted and lined boxes and are easy to work with.
4. Good, sturdy construction which presupposes a good grade of lumber and the best finishes is not easy with light tools. Borrow some friend's power workshop.
5. Include in your construction plan means for the removal of permanent plantings when the plants become

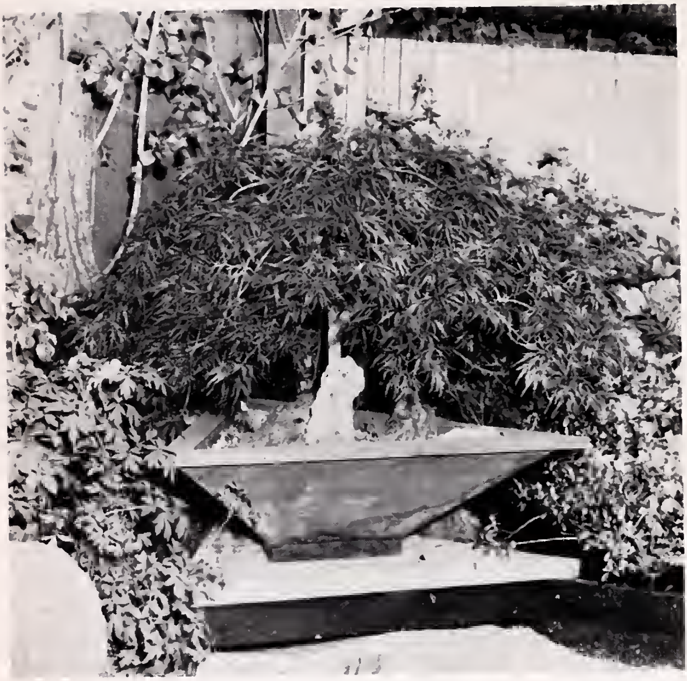
rootbound, particularly when large boxes are employed, *i.e.,* removable sides, metal liners with side hole lifts, pots to fit the box.

6. Plant boxes must be built with air and drainage space underneath. They must have depth enough for strong root growth, probably a minimum of 7 to 8 inches.
7. A waterproof glue is a necessity for holding mitered corners together on a box to be filled with soil, regardless of inside bracing. Water-resistant glue is sufficiently strong for boxes which are lined or have other inside containers.
8. Screws are best for holding boxes together. On redwood, screws or nails must be aluminum, brass, cadmium plated, or galvanized, never steel. Steel and redwood apparently react chemically to hasten deterioration.
9. Finishes depend on settings and type of box:
   (1) paint to match house or trim.
   (2) redwood, for elegance — three coats finishing oil, dull finish; redwood, rustic—rubbed as many times as your patience holds with boiled linseed oil and turpentine, mixed half and half; redwood, natural, no finish, weathers gray.
   (3) cypress—rubbed with oil and turpentine for indoor finish (see photograph on page 37); cypress, natural, weathers silver-gray.
10. Write the California Redwood Association, 576 Sacramento Street, San Francisco 11, California, for information on designs and finishes.

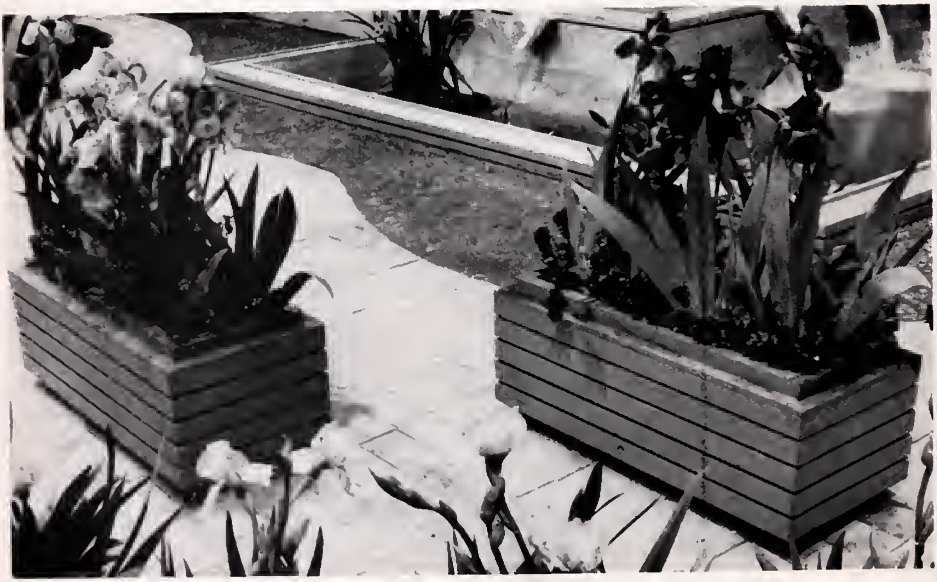
Above, octagonal redwood tub on left is ¼-inch lower, and has lower trim bands (looks stockier) than tub on right.

Below, box on left with added trim line looks shallower than box at right (proportions are identical). *Koch photos*

OTHER SUGGESTIONS FOR WOODEN PLANTERS



Triangular redwood box with thread-leaf Japanese maple (*Acer palmatum* var. *dissectum*).



Palmer

Rectangular boxes with numerous horizontal grooves are attractive in contrast with the sharply upright lines of iris.

Box of oriental design, with rhododendron.

Robinson

Tree wisteria in redwood box.

Palmer

Japanese maple in substantial tub.

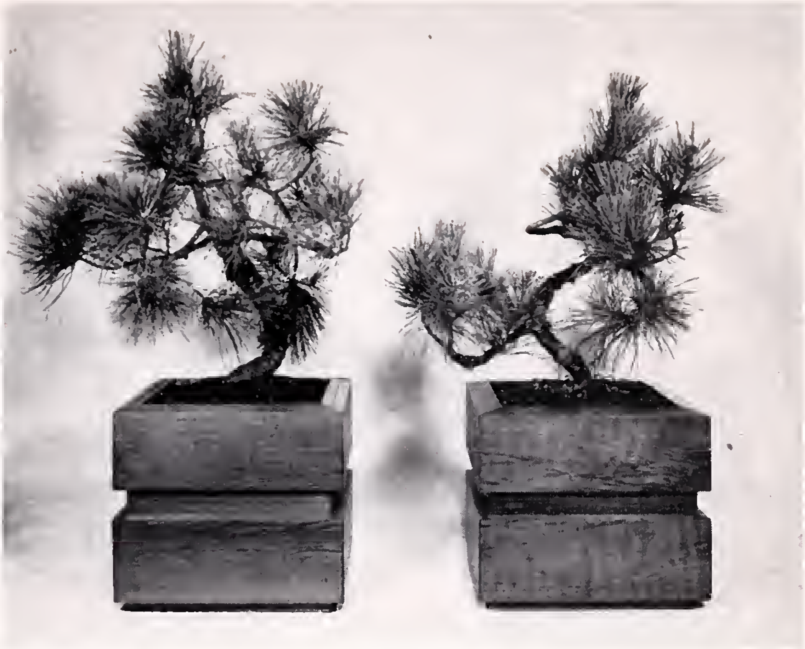
Palmer

Bird-of-Paradise flowers arranged in redwood container.

Photos courtesy Cal. Redwood Assoc.

This geranium thrives in a simple tub.

Gottscho-Schleisner



Koch

Red pines, trained more or less in the Japanese manner, are growing in redwood boxes.

Geranium 'Olympic' and petunia 'Sonata.'

Roche

PLANT CONTAINERS FROM MODERN SYNTHETIC MATERIALS

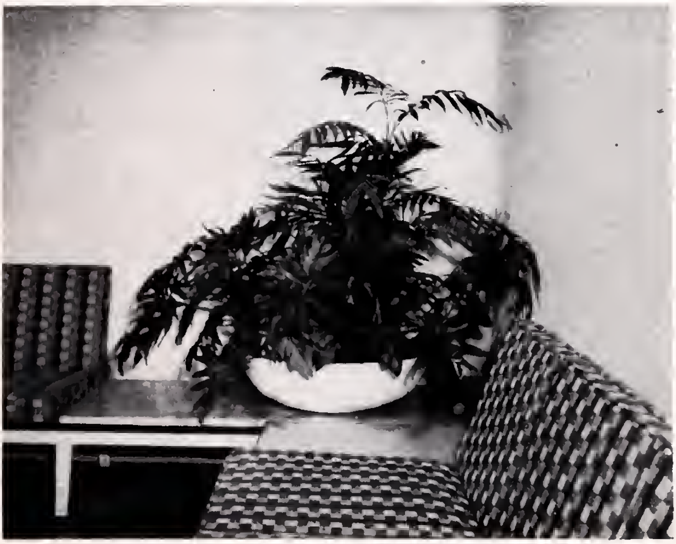
"Gardenglas," a combination of fiber glass and plastic, is made into light, beautiful bowls and tubs for plants

Lois Lister

THE growing of plants in boxes or other containers frequently evolves from lack of garden space. However, this need not be the deciding factor, and handsome containers in themselves may, in fact, readily serve as important features in indoor or outdoor decoration. The container must, of course, be functional, and the choice of plants is important also, but there is no doubt that the type, shape, color, etc., of the container are quite as important in the overall aesthetic effect as the plants set out in it.

My own interest in the subject began some years ago when I moved to a new house in a new district. The garden belonging to the house was no more than potential and much needed to be done to it. As a first step, I acquired an old stone sink, mounted it on large stones in front of the living room window and planted it as a miniature garden. It gave me more pleasure than all the rest of the garden. It was charming; it could be seen from the inside of the house as well as from the outside; it made demands on my skill and ingenuity but not on my strength. I realized that a deliberately limited garden in a container can give keenest satisfaction even to the most inveterate gardener.

Later, in the course of my work as landscape consultant, I frequently found occasion to recommend the use of plant containers in garden design, but all of the



Gardenglas bowl, 26 inches in diameter, makes ideal plant container in modern setting. Here, plants are left in pots and set in coarse vermiculite.

McLeod-Miln

Polyanthus roses and ivy-leaved geraniums growing in same bowl as shown on opposite page.

Panda

materials available for the making of such containers: wood, concrete, terra-cotta or metal, had various disadvantages. Most of all, the materials always limited the choice of shape for the container, and they were either very heavy or too fragile or both. Usually, they could not be safely left out of doors in our northern winters, and some of them allowed the soil to become overheated in summer. Often, too, the surface of the containers became disfigured by efflorescence, fading or flaking. The problems involved intrigued me, and I commenced to experiment with the use of a number of different materials.

The Material

Finally, I came to the conclusion that a polyester resin, reinforced with glassfiber, possesses the desirable qualities to an unusually high degree. This material now is frequently employed in the manufacture of airplane parts, radar domes for the Arctic and in other defense work. It is very light in weight, immensely strong and durable and unaffected by extremes of heat or cold. Horticulturally, it is eminently satisfactory because it does not corrode when in contact with soil, water or fertilizers and is an excellent insulator, so that the roots of plants in such a container are well protected against heat injury even in the most exposed position. Further experimentation developed soft, yet clear colors which are bonded into the material and do not fade. The containers, therefore, never require refinishing. The walls of the containers are completely opaque and have a soft, mat finish. From a practical point of view it is important also that a container which weighs only 5 pounds by itself is able to hold up to 150 pounds of soil. This has the obvious advantages that it can be lifted and handled with ease and that the shipping, even of a whole series of containers, presents no problem.

Containers Are Hand-Moulded

Gardenglas containers are hand-moulded which, as a highly skilled operation, is rather expensive. Pressure moulding, using matched metal dies, would, of course, reduce costs but becomes feasible only in large scale production. Besides, it would be difficult to reproduce with this method of manufacture the pleasing surface texture of the containers which we now are able to achieve. Still, this is likely to be the production method of the future, if

Panda

Formally trained bay trees (*Laurus nobilis*) in 14-inch Gardenglas tubs, Juvenile and Family Court Building, Toronto, Ontario.

the public demand for these containers continues to increase.

Concerning the design of the containers, my aim has been twofold. First, the containers must, of course, be entirely functional. They must provide an adequate root-run for the plants as well as efficient drainage, and they must be able to hold a volume of soil which is adequate to sustain healthy plant growth. Second, through shape and color, the containers must be attractive in appearance by themselves as well as aesthetically pleasing when they are part of a composition of plants and container. Our standard shapes are the following: round, upright containers, 10, 14, and 18 inches diameter; a bowl, 26″ in diameter and 8½″ deep; and rectangular containers, 24″ x 7″ x 7″ or 24″ x 15″ x 12″. The round, upright, 14″ diameter container weighs 3 pounds and holds about 60 pounds of soil. The 26-inch bowl weighs 5 pounds and holds between 120 and 150 pounds of soil. The manufacturing method would readily permit producing still larger containers but these would unavoidably become rather unwieldy, and much better effects can be obtained when moderate-size containers are grouped together.

Gardenglas Is Nonporous

Many people are concerned about the fact that Gardenglas containers are not porous, in contrast to the customary porous clay pots. Actually, this nonporosity is a considerable advantage, as we have been able to prove to our complete satisfaction. On a dry, sunny terrace, or in a modern heated apartment, plants benefit greatly when they are protected against the deleterious effect of a constant loss of moisture through the walls of a porous pot.

Planting Hints

There is no need to give recipes for soil mixtures which are the same whenever plants are grown in any kind of container. However, I have found that, unless the planting is so dense that the surface of the soil is covered, a mulch of gravel or stone chips is distinctly helpful. It conserves moisture and protects the soil surface against overheating, while at the same time it improves the appearance of the planting. A layer of sphagnum moss immediately over the bottom drainage layer holds a reserve of moisture and will

Author courtesy

Root development of roses after one growing season in Gardenglas container.

also absorb excess drainage water so that it does not stain the terrace or balcony floor. For indoor decoration, I prefer to use the 26-inch bowl without drainage hole and to leave the plants in their pots. Coarse vermiculite then is used to fill in between and over the surface of the pots. This looks neat and is very satisfactory also from a cultural point of view, since the vermiculite absorbs surplus water without becoming soggy. In general, indoor plants do best when they are grouped together in a large container because they will then create their own local humid atmosphere.

The choice of plants which may be grown in containers is extraordinarily wide, especially when indoor as well as outdoor container gardening is considered. When the living room air is conditioned or at least humidified and when growing under artificial light is included also, the choice becomes almost limitless.

Winter Treatment

Just as in ordinary outdoor flower-bed gardening, so also with containers, one can readily have a series of seasonal changes throughout the year, by replacing plants when their best season of bloom is over. Or one may establish a fairly permanent basic planting and change only a few plants from time to time. Depending upon local climatic conditions, it is even possible with the larger Gardenglas containers to winter certain hardy plants safely outdoors. We have found as a pleasant surprise that the insulating property of the material of which the containers are made is such that it very appreciably lessens damage from temperature changes. The main hazard to look out for seems to be flooding, which may occur when the container fills with water during a thaw accompanied by rain or slush, while the drainage holes remain frozen. Trouble unavoidably follows when everything freezes again. The container itself does not get damaged, but bulbs, and in fact most plants, suffer severely from such an experience. Protection against flooding, therefore, is imperative but, if this is provided, surprisingly many plants survive. We have successfully wintered a miniature alpine garden in a 26-inch bowl, suffering only very few losses. Polyantha roses also have survived the winter outdoors in such a bowl, though we had sub-zero weather.

Panda

Containers are available in various sizes and shapes.

Another important advantage of containers made of material which not only is almost unbreakable but also very light is that the planting can readily be done at the nursery or greenhouse. A whole roof garden, for instance, could be set up very quickly by having standard containers of this type delivered fully planted. This, certainly, would be less expensive as well as much less bother all around than to have skilled men and trucks work for hours delivering and handling soil, plants and containers separately. The same applies, of course, when only a few containers are wanted for indoor decoration in private homes, public institutions or commercial establishments.

Modern synthetic materials make possible a much wider use of large plant containers which undoubtedly will become increasingly popular. Whether they are used as architectural accents in an extensive garden design, or whether a single container on a balcony high over the city or in the living room represents an entire garden by itself, great pleasure and satisfaction may be derived from container gardening.

PLANT CONTAINERS OF SISAL ROPE

Durable "Cordoramic Vases" are made from unorthodox material

OF the many types of large ornamental vases and plant containers which have come to my notice, these are among the most interesting and handsome. They are fashioned by hand by Mr. Ted Lapins of Montreal, who started doing this as a spare-time project but is now rapidly developing it into a business. Mr. Lapins has been good enough to give me the following information concerning the manufacture of his containers.

The first step is the construction of a form or frame which consists merely of a skeleton of wooden ribs. This must be built in such a manner that it can be taken apart inside the vase and removed after the vase is finished. Naturally, this takes careful designing and considerable craftsmanship because if the form is not absolutely correct to a fraction of an inch or is not stable enough, the vase will be lopsided.

Many kinds of plants thrive in this low sisal rope container.

Sisal rope is the rough, fuzzy rope used, for instance, in boat or ship rigging, and is sold by hardware stores in various sizes. The size of the rope must be chosen according to the effect one wishes to achieve. This rope is wound tightly and very evenly around the skeleton form. In its raw state, the rope is pale ivory in color, and the very pleasing, burnished brown tints of Mr. Lapins' vases are achieved by singeing the rope with a blow-torch after it is wound around the frame.

The bottom and drain of the vase, by the way, must be inserted while the vase is under construction. It cannot be done afterwards.

The next and most tedious step is the treatment of the vase with liquid plastic. A number of different types of liquid plastic are available, but for using them one has to know their qualities since they differ in their reaction to temperature and in other ways. Mr. Lapins prefers one which is produced by the Dominion Rubber Company and is used mainly for treating the surfaces of small boats, yachts, etc. to make them water-tight and water-repellent. A catalyst has to be added to this plastic to cause it to set and harden, and it can be mixed only in small batches because it gets thick within 15 to 20 minutes depending upon the temperature. The maximum temperature at which it can be used conveniently is 70° F. With this plastic the rope has to be thoroughly drenched, which is no small task because the fuzzy hairs of the rope when covered with plastic become hard and as sharp as needles. They have to be smoothed down continuously until they stick securely to the surface of the rope. To cut them off is impossible because this would leave sharp stumps sticking out. Five to six coats of the plastic have to be applied, but after each coat one has to wait until it sets, which may take from 6 to 24 hours, depending upon the temperature.

After the outside of the vase is finished, the frame or form is removed and the inside is treated with plastic in the same manner.

As can readily be seen from this condensed outline, to make this type of plant container or vase is not everybody's meat. It takes artistic ability as well as craftsmanship and enormous patience. The results, however, are wonderful. The vases and containers produced by Mr. Lapins not only are outstandingly beautiful, as the photographs show, but also almost indestructible. When used for ornamentation in the garden, they may readily be left outdoors over winter. However, it is advisable to empty the vases in fall and to cover them so that water cannot accumulate and freeze in them. Particularly those which narrow towards the top might be damaged by ice pressure if they fill with water. A special cover is available which cannot fall off and which contains a series of built-in, water-tight tubes. In these, fruiting twigs of shrubs or conifer branches can be inserted in a decorative arrangement.—H. T.

Photos author courtesy

Tall rope container holds an arrangement of pine and berried branches in winter.

Urn-shaped container is more suited to tall growing palm.

CORDORAMIC
UNIQUE
GARDEN VASES

Hand-crafted of Sisal Rope Embedded in Transparent Plastic

Write to:

TH. LAPINS, TERRACE VAUDREUIL, P.Q., CANADA

A TYPE OF PLANT CONTAINER FOR OFFICE BUILDINGS

Frank Curto

DURING a remodelling operation of the interior of a block of buildings, located on the east side of Oliver Avenue between Wood Street and Liberty Avenue in downtown Pittsburgh, the Oliver-Tyrone Corporation asked the architect, Mr. Charles Stotz of Pittsburgh, whether it would be feasible to incorporate some type of exterior planting on the facade of the building. A solution to this problem acceptable to the client was evolved by the architect and myself. Because of certain limitations of the site, no planting could be located at or near street level. This meant that the planting had to be placed on a ledge some 20 to 25 feet above street level. The width of the containers then had to be limited to the width of the spandrels between the very large plate glass windows, because the windows pivot at the center and rotate out over the ledge when opened.

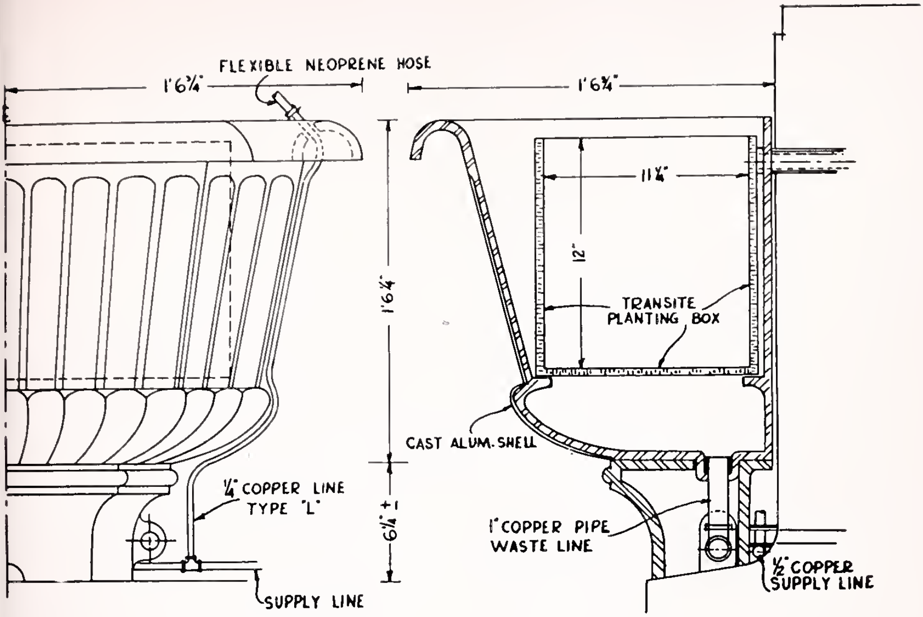
A single row of containers of plants relieves severe lines of office building.

Construction

The accompanying drawing and photograph show rather clearly the location and construction of the twenty-five containers. The exterior container is constructed of cast aluminum and its ornamental design is in keeping with the architecture of the building. These containers are firmly secured to the building with anchor bolts. A drain, provided at the base of each container, empties into a copper drain pipe running the entire length of the building. The actual planting is made into insert boxes, built of transite and made to fit snugly into the aluminum containers. Two sets of these transite boxes were manufactured for the efficient operation of the planting. Watering is accomplished through a ½-inch copper water line which is piped to each box. At each box, a ¼-inch branch of this pipe ends in a nipple to which a short piece of perforated plastic tube, sealed tight at the far end, is attached. This tube is laid on the soil surface between the plants in the box. All the boxes are watered simultaneously through the opening of one valve.

Four Plantings a Year

Four plantings are made in the containers each year. The first planting is made just before Palm Sunday using large pink hydrangea plants and English



Author courtesy

Diagram showing construction of planter, especially designed for facade of building.

ivy. In early May the spring-summer planting is installed. This consists of one large pandanus surrounded by crotons, geraniums, petunias, hibiscus, weeping lantanas and long English ivy. In mid-October, chrysanthemums replace the summer planting. During late November, the boxes are planted with 6-foot blue spruces. The evergreens remain in the boxes until spring. They are covered with small lights at Christmas time.

The planted insert boxes are placed into the aluminum containers from the street by means of a 25-foot ladder mounted on a small truck. At the top, the ladder has a 4-foot horizontal extension. Fitted to this extension is a block and tackle which moves on a single track to the full length of the extension. The planted boxes are hoisted from the sidewalk, high enough to clear the aluminum container. They are then pushed forward on the extension and lowered into the container. With this rigging, three men can remove and install all of the twenty-five boxes in three hours.

Routine maintenance of the spring-summer planting consists of the removal of dead foliage and flowers once during mid-summer season. At this time, the boxes receive 3 gallons of a 15-30-30 liquid fertilizer.

Performance-wise all of the plantings have done remarkably well. However, for the 1958 spring-summer season, more weeping lantanas which have proved particularly satisfactory under our city conditions are going to be used, while petunias and geraniums will be excluded.

This is the first attempt of a planting of this type in the downtown area of Pittsburgh. It has been so successful that the Oliver-Tyrone Corporation now is considering installing additional boxes on other buildings owned by this corporation. Many other firms in the downtown area have been watching the plantings with keen interest. All verbal comments and newspaper articles concerning the plantings have been extremely favorable.

HANGING FLOWER BASKETS

These attractive containers for plants are easier to maintain than commonly supposed

Henry Teuscher

NOT many home gardeners make use of hanging baskets, and the following reasons may account for this fact. Firstly, when such a basket is watered, as it has to be, of course, the water unavoidably drips out of its bottom. This disadvantage may be overcome either by removing the basket to the kitchen for watering and suspending it over the sink, where it is left until it stops dripping, or by attaching to its bottom a tin pan or saucer which collects the surplus water. Secondly, many of the most handsome basket plants require ample light, which means that an indoor basket containing light-loving plants must be suspended as close to the windowpane as possible. Shades and drapes frequently make this difficult. In a deep window, however, brackets may well be fastened to the side walls of the window recess. Where for various reasons the basket cannot be brought closer to the window than 2 or 3 feet, plants which are satisfied with a low light intensity, such as the strawberry geranium (*Saxifraga sarmentosa*), wandering Jew (*Zebrina pendula*), Kenilworth-ivy (*Cymbalaria muralis*), English ivy (*Hedera helix*), *Philodendron oxycardium* and others may be used.

The third and, perhaps, most serious difficulty encountered by the indoor plant-basket fan is the dry heat, rising from the radiator beneath the window, which may defeat all his efforts. Not only does it dry out the basket unevenly—the inside more than the outside—but the difference in temperature between the two sides of the basket will in itself create rather difficult growing conditions for the plants, seriously affecting their roots. For satisfactory results it will always be necessary to deflect the heat of the radiator into the room, making sure that it cannot rise straight up to strike the flower basket. Keeping the radiator under the flower window turned low will be of substantial help also.

The open porch and the garden terrace in summer, or the sunparlor in winter, are particularly well suited to accommodate hanging flower baskets, since they offer the best possible growing conditions for a large variety of basket plants. On the porch the baskets may even be suspended above window boxes, and very charming combinations may be achieved in this manner. A very pleasing and much too rarely seen decoration may be created also by suspending baskets from brackets on or above either one or both sides of the house entrance.

That outdoor flower baskets are much easier to maintain than most people realize is readily demonstrated through their use for street decoration in two Canadian cities. European summer resorts, in Great Britain as well as on the Continent, have employed outdoor hanging flower baskets in their decorating schemes for a very long time.

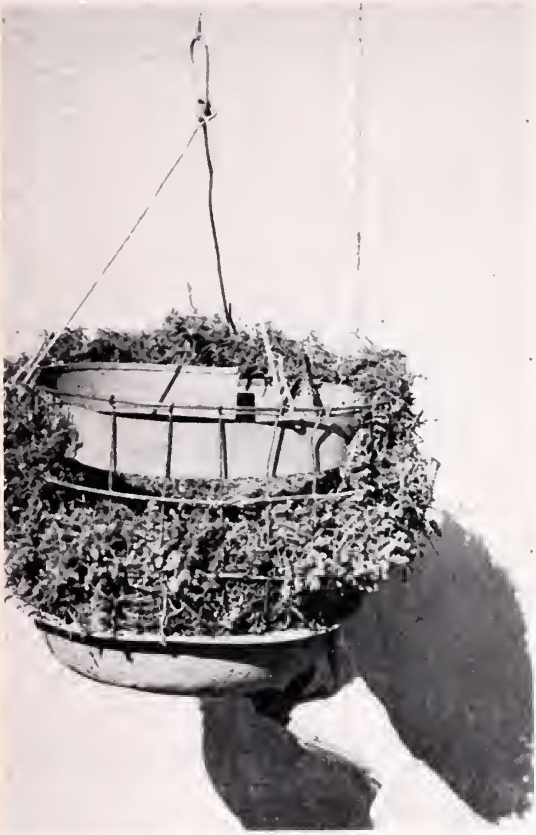
Hanging Baskets on City Streets

The city of Victoria, British Columbia, has pioneered the display of flower baskets on street-light standards in Canada, and this effort to add color and interest to drab city streets, carried on there since 1937, has become a widely known tourist attraction. The photographs which are here reproduced, and which were kindly supplied by Mr. W. H. Warren, park administrator of Victoria, show the attractive appearance of these baskets as

Lamp posts are adorned with hanging baskets of flowering plants in Victoria, British Columbia.

In dry weather in Victoria baskets are watered nightly.

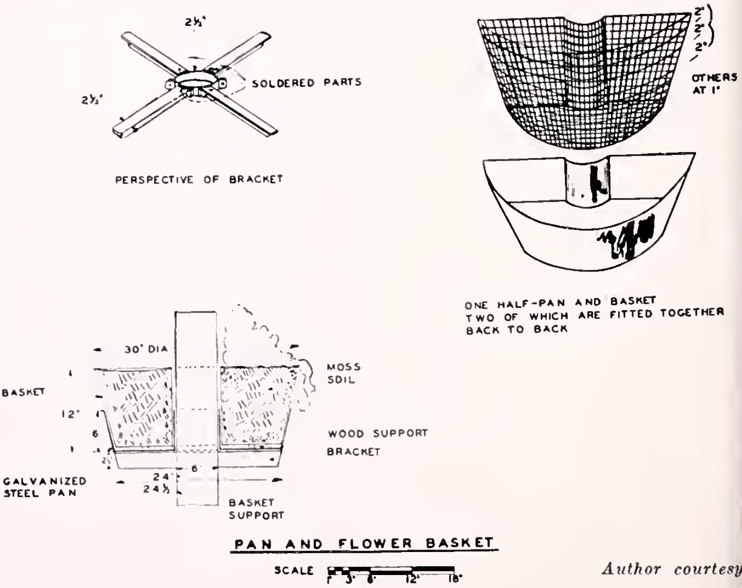
Simpson photos



One type of hanging basket before soil and plants have been put in. Basket is lined with sphagnum. Metal rim at top helps water to soak into center without spilling over edge; basin at bottom catches drainage.
Simpson

well as their construction. Their planting and maintenance are explained in a printed pamphlet, prepared by Mr. Warren and distributed on request by the Victoria Park Department. The following details may be quoted:

The baskets, 15 inches in diameter and 12 inches deep, are made of 9-gauge wire. The tripod on which the basket hangs is a 12-gauge wire. The iron rod, clamped to the lamp post 11 feet above street level, is square in shape, ⅜ inches (in thickness) x 1½ inches. Notches are cut into this rod, 20 inches from the lamp post, and the rings on top of the basket tripods fit into these notches. The basket itself is lined with sphagnum moss (about 1 to 1½ inches thick) and a 2-inch strip of galvanized iron is fitted around the rim of the basket, so as to be inside the moss and just above the soil level. The purpose of this



PERSPECTIVE OF BRACKET

ONE HALF-PAN AND BASKET TWO OF WHICH ARE FITTED TOGETHER BACK TO BACK

PAN AND FLOWER BASKET

Construction drawing of lamp post basket used in Montreal. Two half-baskets are screwed together around lamp post.

Author courtesy

A pendent begonia (*Begonia foliosa*) in hanging basket made of wood strips.
Author courtesy

collar is to allow the irrigation water to penetrate the center of the basket and to prevent it from running off on the outside. A size 34 metal basin, painted moss-green outside and treated with roofing cement inside, is attached to the bottom of the basket and acts as a water reservoir.

The soil mixture in the baskets consists of 9 parts well decomposed, sterilized sod soil, 2 parts of peat moss, and 1 part of sand. To each bushel of this mixture is added: 2 ounces agricultural lime, 1 ounce powdered hoof and horn, 2 ounces superphosphate and 1 ounce sulfate of potash.

The baskets are watered six times a week at night, between 11 p.m. and 7:30 a.m., for which a tank truck with two men is used. One man drives the truck while the other does the watering by means of a light pipe which at its upper end is curved like a shepherd's crook. A pump, operated by the truck engine, supplies the water pressure.

Commencing about 3 weeks after placing them in position, the baskets are fed every 2 or 3 weeks with a dissolved fertilizer, prepared at the rate of 3 pounds per 200 gallons of water. Mr. Warren states that various complete fertilizers were tried but all failed to produce the expected results because the potash they contained caused the stems, especially of the petunias, to harden prematurely so that they ceased flowering. Complete satisfaction finally was obtained with ammophos (16-20-0) which now is used exclusively on the baskets.

The plants which have given the best results in the street baskets of the City of Victoria are the following: ivy-leaved geranium (*Pelargonium peltatum*) 'Enchantress'; *Petunia hybrida nana compacta* 'Rose Queen improved'; *Lobelia erinus pendula* 'Sapphire'; *Schizanthus* 'Giant Blotched'; *Coreopsis* 'Dazzler'; *Viscaria coeli-rosa* 'Blue Bonnet' and 'Rose Beauty'; marigold (*Tagetes tenuifolia*) 'Golden Gem'; nasturtium (*Tropaeolum majus*) 'Hermine Grashoff' and *Nepeta hederacea variegata (Glecoma)*.

In Montreal we have so far found compacta petunias, upright geraniums of the Zonale type (*Pelargonium hortorum*)—not the ivy-leaved geranium—nepeta and variegated periwinkle (*Vinca major variegata*) most satisfactory. *Schizanthus, Coreopsis* and *Viscaria* definitely do not succeed well with us. However, we are by no means through experimenting with others, and Mr. Warren rightly emphasizes that to obtain best results one has to test many different plants because local conditions often vary widely.

The City of Montreal decided two years ago to decorate the lamp posts in several of the main thoroughfares with flower baskets. The principles applied are the same as in Victoria, though the baskets are of slightly different construction as the accompanying drawings illustrate. The streets involved are wide and in consequence often windy. Free-hanging bas-

Author courtesy

Planting strawberry-geraniums (*Saxifraga sarmentosa*) in a small moss-lined wire basket. Plants soon spread out and conceal basket.

kets, therefore, were considered unsuitable, and the baskets were built in two halves which are clamped together around the lamp post, 8 to 9 feet above street level. They rest on a collar with four radiating spokes. The pan underneath is 6 inches deep, and the basket rests in it for half its depth. This is very satisfactory in a hot, dry summer or during a prolonged dry spell but, if heavy rains continue for any length of time, the baskets remain too wet, and it becomes necessary to empty the pan. We are not quite sure yet how to strike a happy medium.

Our soil mixture consists of 9 parts sod soil, composted with cow manure, 2 parts peat moss and 1 part sharp sand. To each bushel of this is added 1 four-inch flowerpotful of bonemeal and half that quantity of dried blood. The difference in composition results from the inherent differences in our soil, and similar adjustments will have to be made wherever such baskets are used. Our treatment of the baskets after they are put in place is the same as in Victoria, though our baskets are watered only every second day and, if it rains, only every third or fourth day. It takes two men on a tank truck approximately 8 hours to water the 100 baskets now in use.

For the Home Gardener

The home gardener also will have to adjust his soil mixture and routine treatment to suit local conditions but his baskets will rarely be exposed to the rough treatment which lamp post baskets have to tolerate. In consequence, his choice of plant material is much wider. Hanging tuberous begonias, for instance, or hanging carnations and many other handsome flowering basket plants are well within his reach. His choice is wide, and I may be permitted to refer once more to my book, WINDOW-BOX GARDENING, which includes a long list of plants suitable for basket growing as well as detailed instructions on the preparation of hanging baskets.

Some Unusual Plants for Hanging Baskets

Orange streptosolen *(Streptosolen jamesoni)*
  Clusters of bright orange flowers in winter

Trailing lantana *(Lantana montevidensis)*
  Round heads of rosy-lavender flowers

Little pickles *(Othonna crassifolia)*
  Fleshy, cylindrical leaves and small yellow flowers

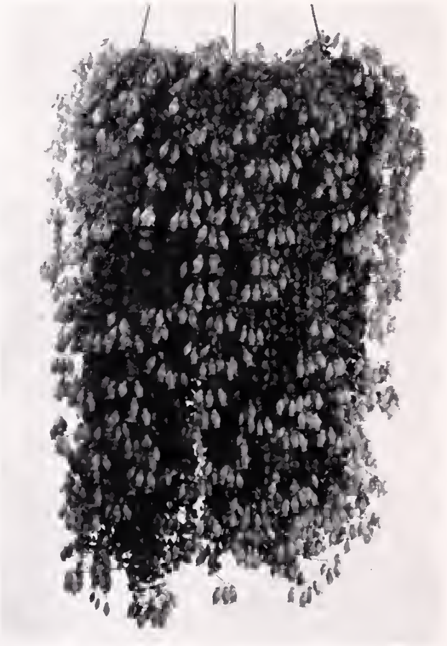
Wire vine *(Muehlenbeckia complexa)*
  Very small leaves and small white, glistening fruits

Coral gem *(Lotus bertheloti)*
  Feathery gray leaves and scarlet flowers (not easy to grow)

Roche

Many kinds of begonias are suitable subjects for hanging baskets.

Kenilworth-ivy (*Cymbalaria muralis*) in hanging basket.


Photos author courtesy

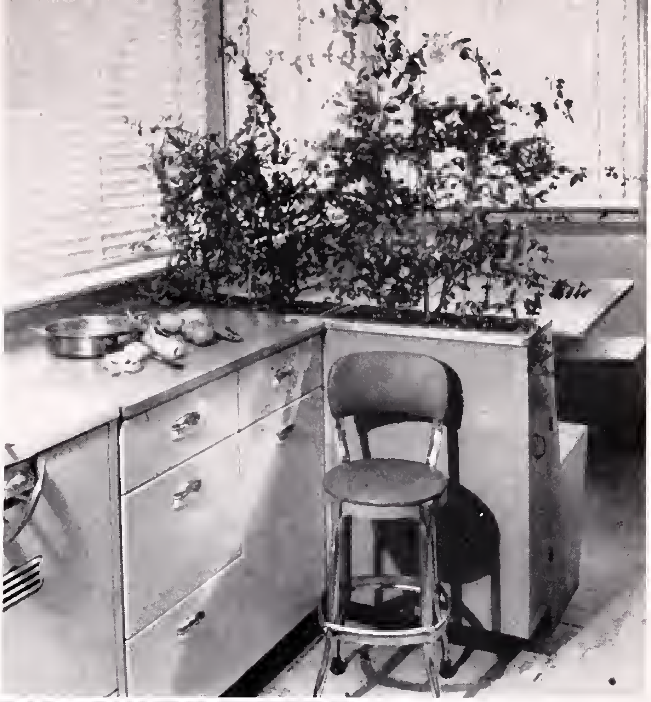
Kalanchoe uniflora (*Brophyllum*) is an unusual plant for hanging baskets.

PLANTERS

The type of container usually called a planter is in reality merely a revival of what earlier generations called a "Jardinière." Most planters are made of metal, the legs raising the rim to about 30 inches from the floor. The box itself may be 3 to 4 feet long, 10 to 18 inches wide and about 8 inches deep. Green foliage plants, such as schefflera, fatsia, fatshedera, aspidistra and philodendron or sansevieria are most commonly employed in the planter and usually are left in their pots. All space between the pots is then filled with sphagnum moss or peat moss or gravel. The most frequent use of the planter is as a room divider, either in the home or in airport waiting rooms, hotel lobbies, hospitals and offices. The above mentioned plants last for about 6 months in reasonably good condition even when the planter stands far away from a window. However, the usefulness of such a containers as well as the life expectancy of the plants in it are greatly extended if artificial light is supplied in the proper manner and the required duration. This should consist of a combination of two 40-watt cold-white fluorescent bulbs between the fluorescent tubes. The lights should be suspended about one foot above the foliage of the plants and must be kept burning for 10 to 12 hours each day. The number of such light units, arranged end to end, which are required depends of course upon the length of the planter. With artificial light various flowering plants, such as begonias and many others, can also be kept in a planter, while foliage plants last until they become too large. In addition, the ornamental effect of the whole plant arrangement will be greatly enhanced.

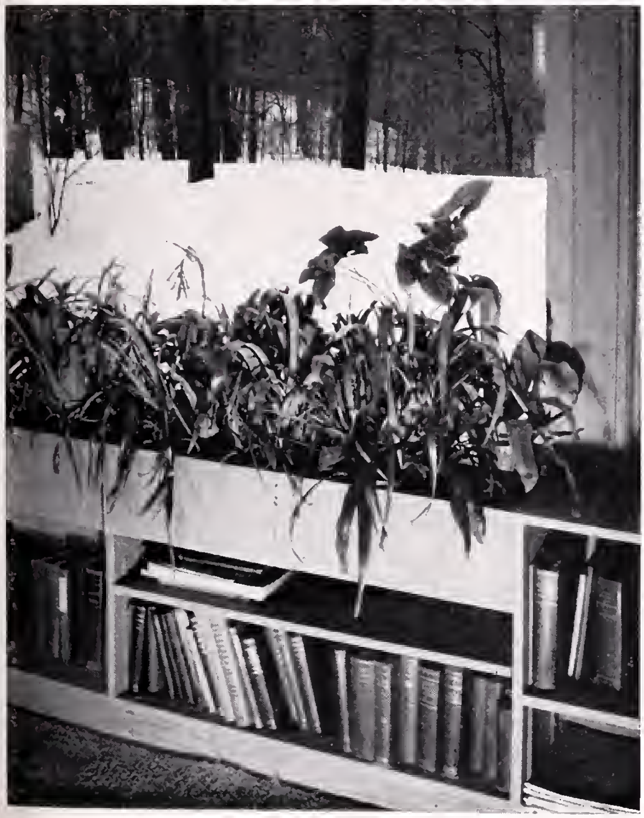
Gottscho-Schleisner

Planter used as room divider.

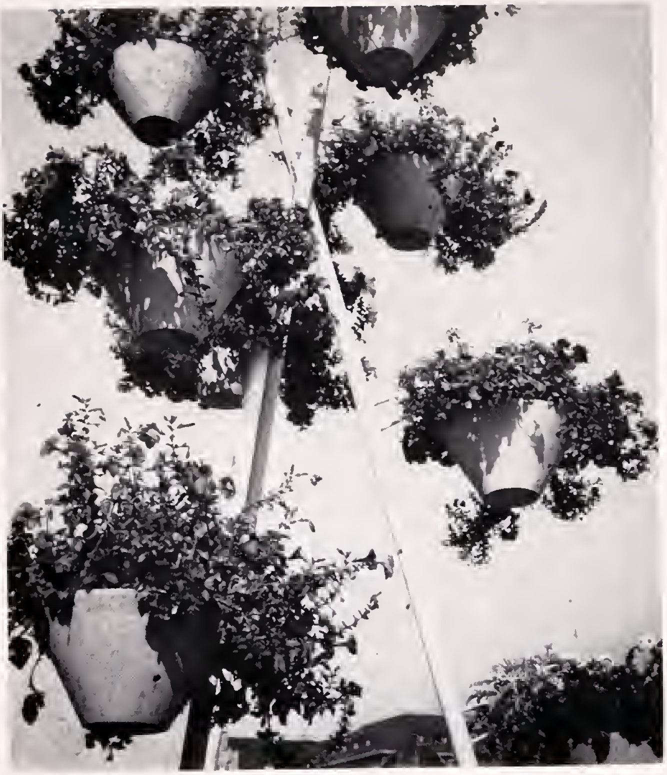


Built-in planter makes possible an indoor "hedge" between dining alcove and kitchen.

Roche photos



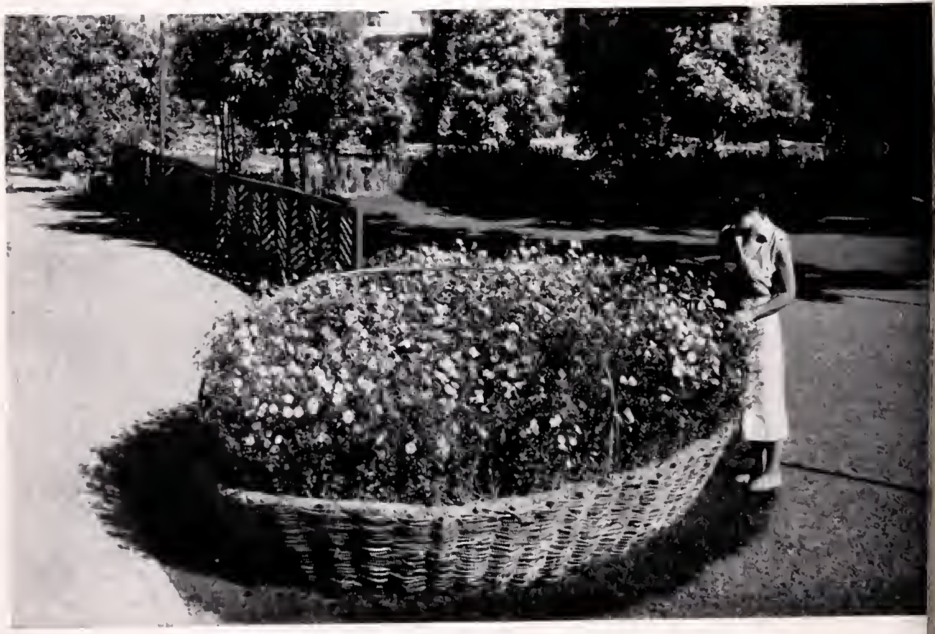
Bromeliads and other tropical plants thrive in this planter built into a bookcase.



Cement flower pots mounted on tripod of pipe makes this unusual decoration of contemporary design for a street in Switzerland.

Novel container for bed of petunias in Shiraz, Iran, is a huge woven basket filled with soil.

Gantner photos



MINIATURE GARDENS

By proper choice of container and plants, an entire garden can be established and maintained in a space two or three feet square

Alys Sutcliffe

ANY city apartment with even the smallest balcony or terrace can have a miniature garden—a complete garden, not just a window box. And there is a joy and satisfaction to be had from such a garden that the window box, beautiful though it may be, never quite provides. Such miniature gardens may be as varied in style and in the plants composing them as full-sized gardens are.

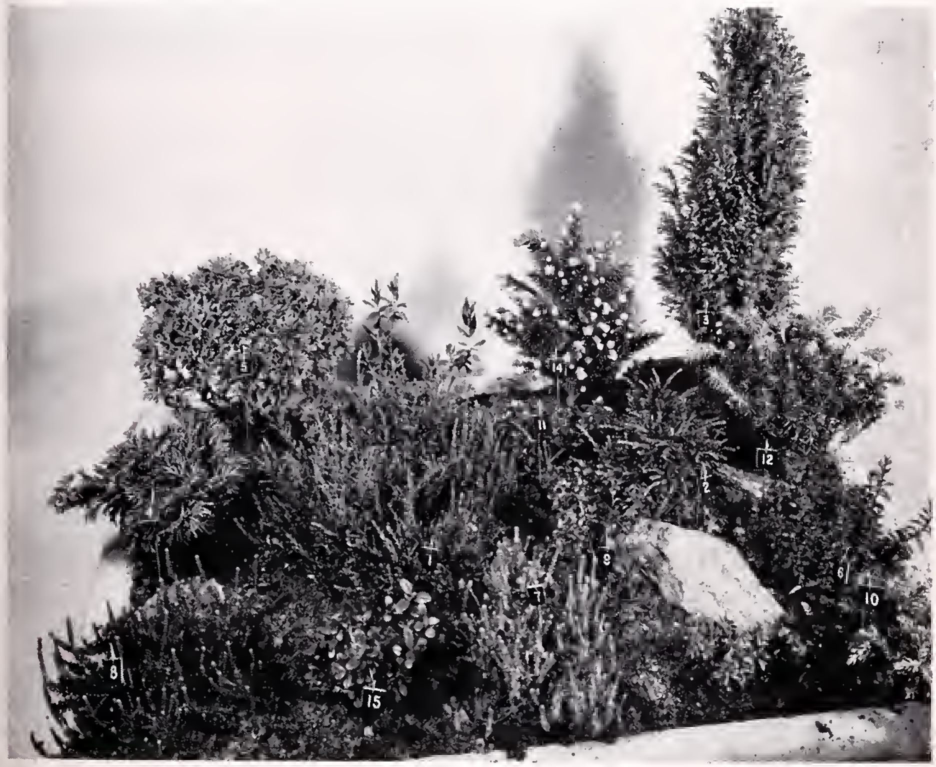
The containers for these miniature gardens may be constructed of stone, wood or concrete. Successful ones have even been grown in old kitchen sinks. Little soil is needed (4 to 5 inches inside depth of the containers is sufficient) and they are easy to maintain. Because of their miniature size, they are much easier to see and appreciate if raised on stands to about knee or waist level, and this also makes working in them less effort. Following are some of the kinds which have been successful at the Brooklyn Botanic Garden.

A Garden of Heather

One of the great advantages of minia-

Miniature garden planted chiefly with heaths and heathers.

Gottscho-Schleisner



Gottscho-Schleisne

Small woodland plants grow successfully in miniature garden.

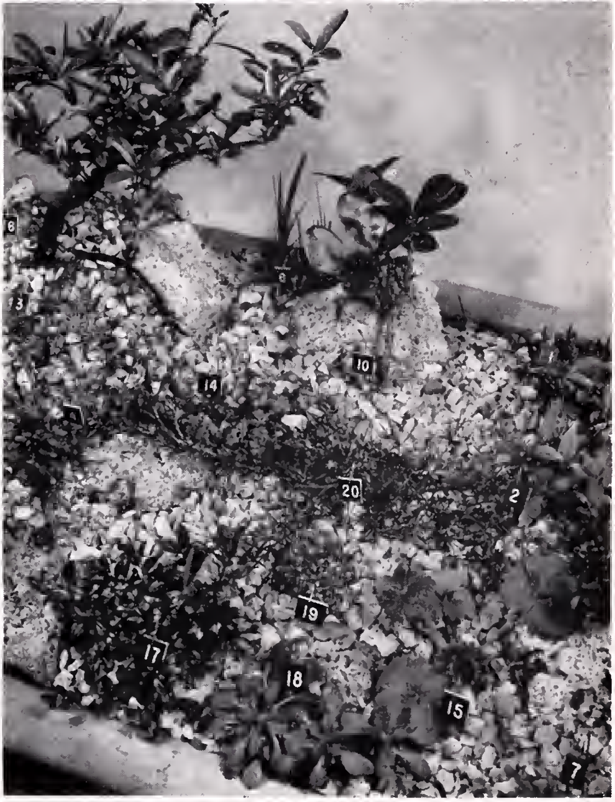
ture gardens is that the soil mixture in each can be easily controlled to suit the particular plants desired. A very successful garden is the one shown here, containing a collection of small heaths and heathers. They have flourished so well that some of them have had to be divided. These plants require a light and acid soil, so the container for this garden was filled with peat moss with a little sand and soil mixed with it.

Woodland Garden

The second garden illustrated is a bit of woodland in which the plants have flourished for over five years, with little or no attention beyond watering in dry weather. The container for this garden is appropriately constructed of white pine which has been treated with Cuprinol. It measures 29 by 19 by 5 inches and als has drainage holes in the bottom. The soi is a light woods loam.

Small pines and hemlocks brought fro the wild have done so well in this garde that they now have to be pruned yearl to keep them properly in scale with th rest of the garden. Trailing arbutu flowers each spring as does the partridg berry. The latter, like many wild plant grown under city conditions, does not se fruit, but it makes a beautiful green ma under the pines. The tiny flowers o birdseye primrose (*Primula farinosa* make an attractive show, and do see themselves. Wintergreen flowers an fruits and is beginning to hang graceful over the side of the container. Blue (*Houstonia caerulea*) grow and flower f a year or two, but here in the city ma have to be replaced from time to tim

Buhle



This miniature rock garden features choice alpine plants, among which are:

- *Arenaria caroliniana* (1)
- *Callicarpa japonica* (2)
- *Cheilanthes densa* (3)
- *Genista delphinensis* (4)
- *Iris arenaria* (6)
- *Ligustrum japonicum rotundifolium* (10)
- *Potentilla cinerea* (14)
- *P. fragiformis* (15)
- *Pyracantha* sp. (16)
- *Salix uva-ursi* (17)
- *Scabiosa alpina* (18)
- *Sempervivum arachnoideum* (19)
- *Spergularia rubra* (20)

Gottscho-Schleisner

A complete rose garden in miniature.

Many other wild plants will thrive in such a miniature garden—the important thing in choosing them is to select those that are, upon maturity or after a few years' growth, the right size to be in proportion to the container. It is strongly recommended that plants be obtained from nurseries dealing in native plants, not only because such plants do better than those transplanted from the woods, but in the interests of conservation.

Miniature Rock Garden

The little rock garden shown in the photographs on page 65 was planted in a concrete container. Such a container is easily poured in a wooden form and can be made any size or shape desired. The walls are reinforced with wire and drainage holes are provided in the bottom. The one illustrated is 25 inches long, 19 inches wide, and 4 inches deep (inside measurements).

The soil mixture in this garden consists of 1/3 garden soil, 1/3 sand and 1/3 peat moss. A few rocks are firmly set in it, and there is a generous mulch of granite chips on the surface. It is fertilized with a little bone meal once or twice a year.

Many rock garden plants lend themselves well to growing in a miniature garden. Indeed, some of the smallest kinds are easier to keep track of in such a garden than out in a full-sized rock garden, and they will grow for years. The small shrub in the garden shown is *Pyracantha coccinea*, which although normally a large shrub, will flower and fruit even when kept pruned back to a height of only 9 to 12 inches. All of the plants in this garden do best in a well-drained soil.

Miniature Roses

Gardening on a miniature scale ca
even put a rose garden within reach o
many for whom such a garden has seeme
an unattainable dream. There are no
available a great number of varieties o
miniature roses, and more are appearin
all the time. Some are taller than other
and can be trained along a little trellis
others can be trained as tree or standar
roses; and there are the small bush typ
for the beds. The miniature rose garde

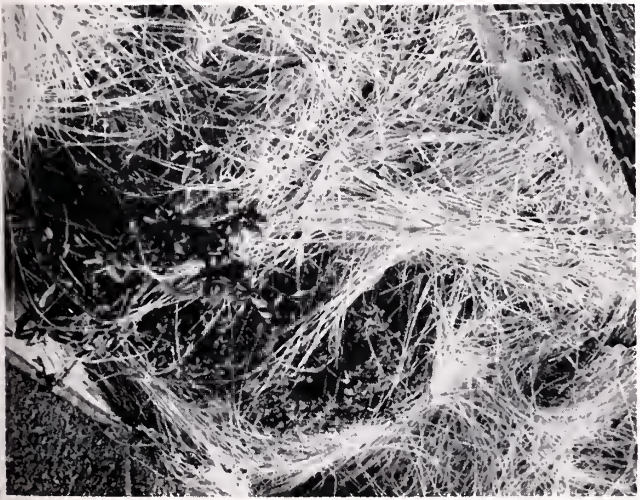
For winter protection straw is packed around miniature gardens and held in place by chicken wire.

may be as elaborate as time and ingenuity allow. It should be remembered that the more elaborate the structures are, the less well they may stand up under the weather. A roofed porch or even a frame of wood covered with plastic will give adequate protection from the worst storms.

The roses in such a garden will flower off and on all during the spring and summer. Like their larger counterparts, they may be attacked by aphids from time to time, but these are easily controlled by spraying.

Care in Winter

Except in the warmer parts of the country, winter protection of miniature gardens is advisable. Winter conditions on exposed terraces or balconies of city buildings can be very rigorous. The gardens should be placed against the house, or any wall, and raised slightly from the ground. Salt hay or excelsior is packed around the containers, and a light covering of the material spread over the plants themselves. A low fence of chicken wire placed around the whole will prevent the hay from blowing away.



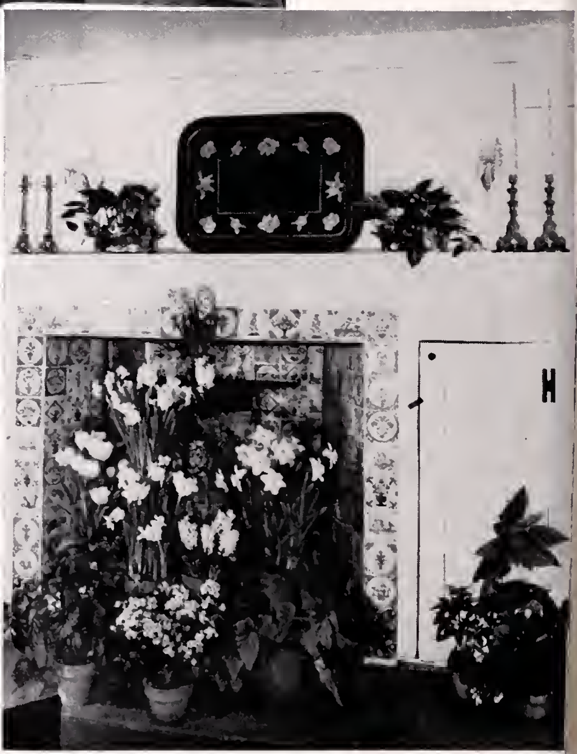
Light covering of straw is spread over the plants themselves.

Buhle photos

PLANTS IN FLOWER POTS

Geraniums in pots brighten this flight of steps in Iran.

Gantner



Pots of spring bulbs and house plants grouped for mass display.

Roche

Decorative bracket with pots of geraniums breaks large expanse of wall.
Roche

Pots of flowering plants soften transition from garden to white brick wall.
Gottscho-Schleisner

Self-watering flower pot can be left two or three days without drying out.
Roche

Woven baskets may add decorative touch and conceal unattractive flower pots.

Roche

Roche

Pots of geraniums set in basket lined with aluminum foil and filled with sphagnum.

Costa

Strawberry jar is an attractive accessory i many gardens and can be used for plant other than strawberries if desired.

A SMALL CITY ROOF GARDEN

Alice Recknagel Ireys

TO garden or not to garden is a question for any city dweller, but on a high windy roof it becomes a challenge, if one is really interested. A young couple living in an apartment overlooking the roof tops and church spires of old Brooklyn, wanted the fun of growing things. So, to them, having a garden spot just outside their living room, with continuous bloom from May to December, was a challenge they eagerly accepted.

For several years this young family had tried, with little success, to grow things in small flower boxes and pots. They were anxious to have plants that would withstand the wind and beating sun, always roof-top problems, but they also asked for originality in the design of the

Awning over a part of this small city roof garden provides shelter from hot summer sun.

Young photos

Redwood boxes provide planting beds.

flower boxes. To provide adequate outdoor growing space, boxes had to be built which provided the necessary drainage as well as a minimum depth of soil. Since the lasting quality of the material of which such boxes are made is important also, it was decided after much discussion to use redwood for its durability as well as for its color. By the use of blends of oils and stains the color of the redwood was retained, thus not only assuring a pleasing and harmonious appearance but also long life of the boxes under severe conditions. (See page 41.)

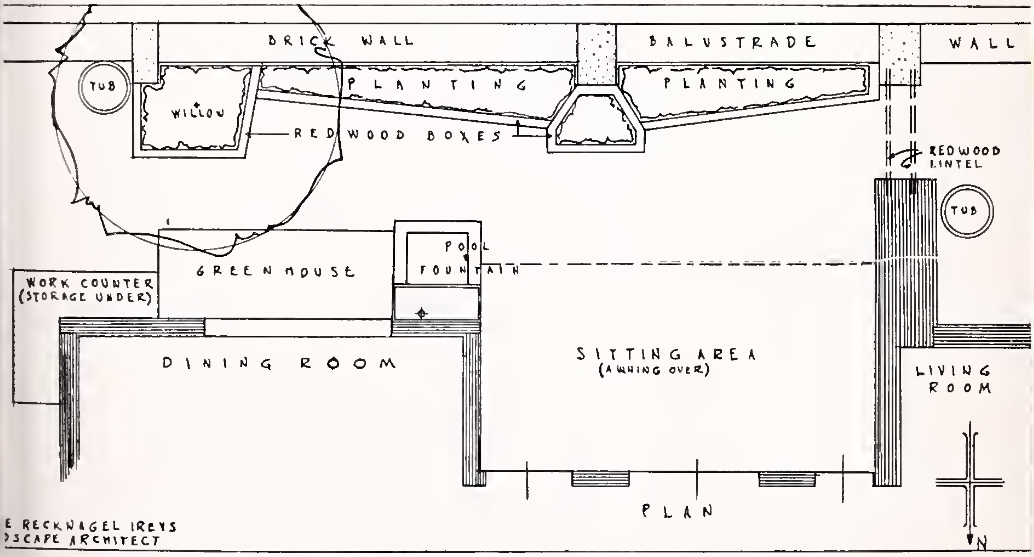
The overall design includes a sitting area which had to be given as much space as possible while still leaving room for a frame of green plants needed to hide the high parapet and balustrade surrounding this area. Part of the outdoor living space is covered by an awning, as the terrace room faces south, which permits taking advantage of the prevailing summer breeze. This area, approximately 10 x 1 feet, has a long narrow box which is 1 inches wide at one end and 2½ feet a the other. A large tub of a higher desig backed up against a buttress serves t terminate the straight box line. On th opposite side an ugly drain pipe had t be hidden, which was accomplished b means of a redwood screen with a lo pool in front of it. Continuous flowin water spouting from a frog, called "An thony Rawley," not only adds a delightf sound but helps to keep the air cool. T inexpensive automatic pump required f this small fountain uses little water an the sedges (*Cyperus*) which ornament the pool are easy plants to accommodate in water.

It was felt that the appearance of the whole area would be more pleasing if two more boxes were added so as to produce more of a real garden feeling. One of these is of the same pattern as the box used opposite the sitting area. Its flowers not only are enjoyed from the terrace but may be used also for cutting purposes. The second box, located farthest to the east, contains a willow tree which gives a charming feathery effect. It is one of the best plants to use on a roof because it is able to resist strong winds and driving rains. This tree can be seen also from the high windows of the dining room.

In selecting plant material, a color scheme of white and yellow was decided upon. English ivy was used to break the horizontal line of the boxes, and morning glories and fleece vine to break the vertical line of the wall. White petunias and yellow marigolds were chosen for summer bloom and did very well during June, July and August. Spider flowers (*Cleome*), the white variety 'Helen Campbell,' were chosen for their height and light effect and were most successful in the taller boxes. A few heliotrope plants for accent provided a touch of color. With daily watering and weekly spraying the flower garden bloomed abundantly throughout the hot summer months.

To change the planting, when the first cool days of September set in, is easy with such a garden, since all that is needed is to remove the summer plants and to substitute chrysanthemums of various heights and colors. Warm copper tones of spoon varieties were mingled with soft yellow and cream pompoms, and all of these were enjoyed for three months. It was with reluctance that they were removed, after heavy frost, at the end of November, when a planting of early spring bulbs was put in. So, a new season of color in this little garden starts again in spring.

By judicious use of planting boxes, an outdoor living area has been developed on this small roof, which provides the pleasant spaciousness of a well planned, finely executed and carefully tended garden.



Plan of roof garden.

VEGETABLE GARDEN ON A ROOF

Vegetables can be grown as successfully in containers on roofs and terraces as can ornamentals

George A. Carle

WITH the constant expansion of city limits, and the reduction of farming areas, is it not possible that the many thousands of acres of roof-top might be used for the growing of vegetables in the "farms of the future"? Experience in the Children's Garden, part of the educational program of the Brooklyn Botanic Garden, has shown that very substantial crops of vegetables can be obtained from a small, 80-square-foot plot of ground.

While it may be some time before truck gardening on a wide scale is carried out on city roofs, apartment dwellers and home owners with access to terraces or roofs can derive pleasure and satisfaction from raising many of their own vegetables in roof-top container gardens. The accompanying photographs illustrate what has been done in one such small scale garden.

Suitable planting containers can be

Good crop of vegetables can be grown in surprisingly small space on roof.

onstructed of many materials. Wood, the least expensive and easiest to use, is suitable for a temporary garden. Cinder block is slightly more expensive but is more durable and is ideally suited for this kind of garden. It can be made to look more attractive by facing with stucco, or a plain cement wash may be applied. Brick and field stone are the most expensive materials and need be considered only where attractiveness of the containers is a primary consideration.

The beds are constructed at knee level, making them very easy of access in planting, cultivating and other necessary care. One advantage and pleasure in such a garden is that there are no slippery, muddy walks between the beds in wet weather.

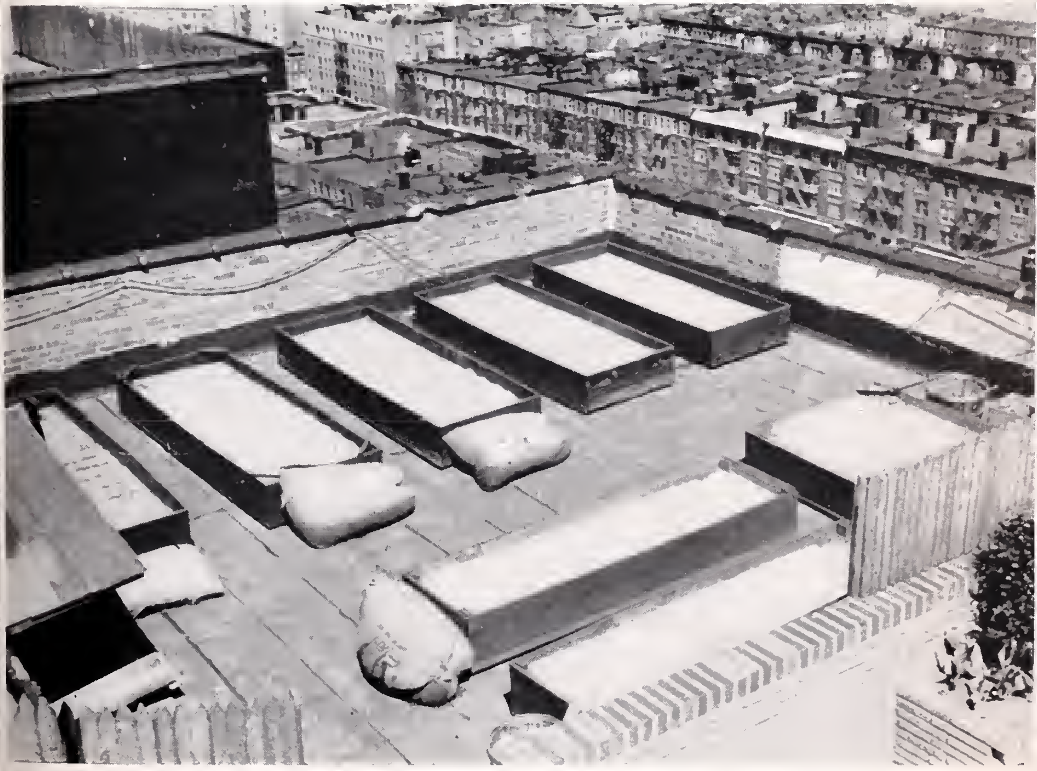
The major cost of such a garden is the expense of providing the soil, so it is worth slight additional expense to learn the optimum soil requirements of the types of crops desired. An appreciable saving can be realized by taking into consideration the depth of soil required for each vegetable. For example, radishes and lettuce can be grown in shallower containers, requiring less soil to fill than can carrots.

Drainage, important in ordinary gardening, must also be considered in "sky farming." Openings must be left at the bottoms of the containers, and a 2- to 3-inch layer of coarse gravel or small stone placed over the bottom before soil is added.

Tomatoes, radishes, carrots, beets, kale, lettuce, kohlrabi, spinach and bush beans are some of the vegetables which the author has grown successfully in this rooftop garden.

Boxes of soil for growing vegetables on roof. Before such a project is undertaken, it must be made certain that roof can support the extra weight (See page 4).

Author photos



Large brick window box provides ample planting space for cheerful spring display of tulips, alyssum and candytuft.

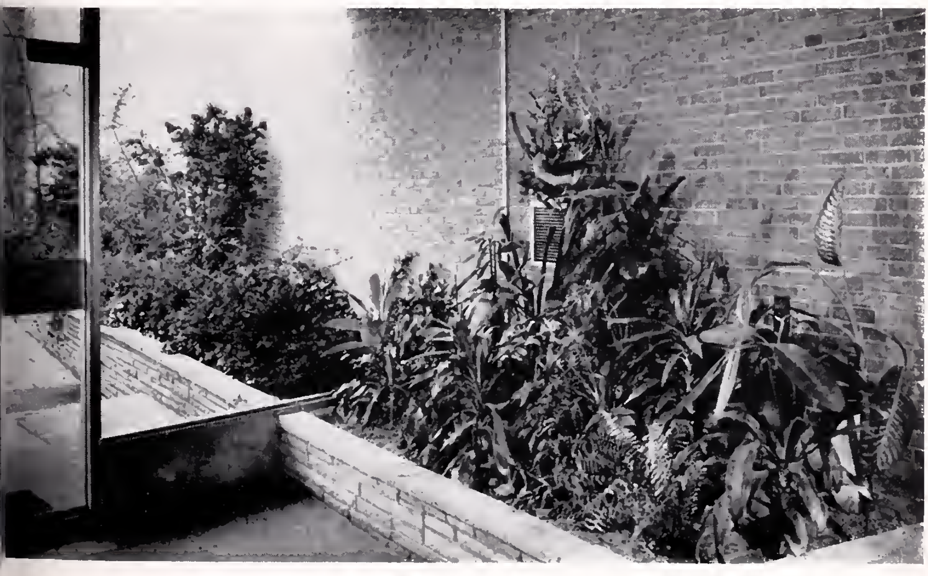
Roche photos

ulips and pansies grow-
ng in box built into top
of brick wall.

Roche

uilt-in planting box extends in both directions from glass partition. Care should be taken that inside and outside plantings harmonize.

Gottscho-Schleisner



SUCCULENTS IN CONTAINERS

A great many succulents can be grown very successfully in containers. A satisfactory planting mixture for most of them consists of equal parts of sharp sand, soil and peat moss. To each quart of the mixture a small handful of charcoal (pieces about the size of peas) and a teaspoonful of bone-meal are added.

When containers with drainage holes are used, a layer of broken flower pot or gravel should be placed on the bottom as is usual when planting in pots. However, succulents are often grown in containers having no provision for drainage. In these, no "drainage" layer on the bottom should be used as such a layer simply acts as a trap for stagnant water and is likely to cause more harm than good. The procedure with such containers is to water with great care, using just enough water to moisten the soil without soaking it.

Roche

Top left Some succulents lend themselves to growing in hanging baskets.

Cacti and small succulents in a miniatu desert garden.

Other types of desert gardens. Small strawberry jar lends itself admirably to growing succulents.

CONTAINER-GROWN NURSERY STOCK

ips for the nurseryman as well as the uyer of nursery stock

Ray R. Hirt

MORE and more nurserymen are raising their stock in tin cans or other npervious containers. This system offers veral advantages to both dealer and uyer, but also has certain hazards which ust not be overlooked.

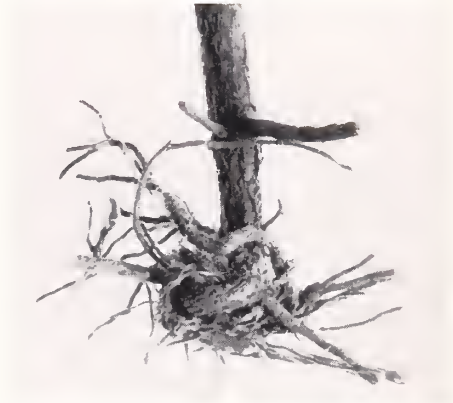
Advantages

A nurseryman can display his plants or take-home purchase when they are in ll leaf or flower—or at any season.

Plants can be transplanted from conainers to soil with little or no disturbnce of the roots.

Disadvantages

Main roots may become bent and twistl from confinement in containers, formng a distorted and tangled ball of roots. s the roots increase in diameter, they nd to strangle one another. Such roots



Author courtesy

Rooted cutting which was grown in a container for one season, then in the field for one year. The roots, distorted by a container that was too small, remain tangled and are likely to self-strangle as they increase in size.

Nursery stock growing in cans.

Courtesy E. Clark

cannot be straightened at planting-out time without breaking, and if planted "as is," normal root spread will not occur. Moreover, tangled main roots give rise to few branch roots, resulting in the general reduction of size and effectiveness of the root system.

Under the usual nursery care, abundant watering and fertilizing results in good growth of branches and leaves, even though the root system is gnarled and restricted. When such trees and shrubs are transplanted from the cans into the garden, the cramped root system is inadequate for the large top, and poor growth or even death may result.

Permanent Planting in Containers

Plants can be grown more or less permanently in containers, but if so, special care should be given them. It is a good practice to periodically "re-pot" (every one or two years), during the dormant season. Prune off any dominant roots that may have become established (see caption below). This prevents the formation of a strangling mass of roots, and also encourages the growth of small branch roots which are the ones active in absorption of water and minerals from the soil.

Warning to Nurserymen*

Containers for nursery stock should be large enough to accommodate the roots without undue cramping.

Nursery stock must not be grown in containers too long.

Warning to Purchasers

Tops of container-grown plants should be judiciously pruned back at the time of transplanting in order to maintain balance between roots and shoots while the plant is getting re-established.

---

*Nurserymen growing plants in container will find THE U. C. SYSTEM FOR PRODUCIN HEALTHY CONTAINER-GROWN PLANTS, edite by Kenneth F. Baker, of great value. Thi 332-page manual can be obtained for $ from Agricultural Publications, 22 Gianni Hall, University of California, Berkeley California.

Root-pruning is an e
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Japanese horticultur
practice in the gro
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trees (bonsai). Bo
sai such as this tw
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white pine (*Pinus p
viflora*) can be ke
growing in the sa
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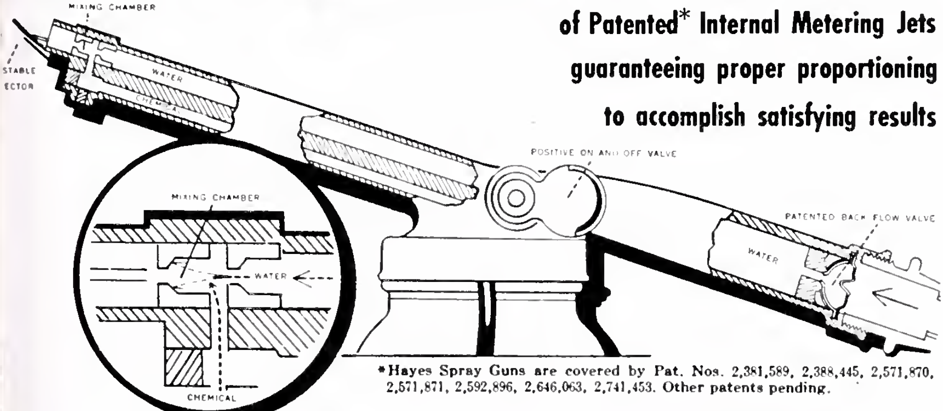

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Scented
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Thymes

UMMER
1958

SERIES
No. 2

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COMMITTEE FROM THE NEW YORK UNIT OF THE AMERICAN HERB SOCIETY,
ELIZABETH R. VAN BRUNT, *Chairman*
PETER K. NELSON, *Associate Editor*
and the Editorial Committee of the Brooklyn Botanic Garden

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Gottscho-Schleisner

An old-fashioned herb garden.

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
BROOKLYN BOTANIC GARDEN
1000 WASHINGTON AVENUE
BROOKLYN 25, NEW YORK
TELEPHONE: MAIN 2-4433

Summer, 1958

It was just eight years ago that we published our first **HANDBOOK ON HERBS.** It was shortly out of print, and our Editorial Committee knew that sooner or later a new Handbook would be needed. So, in the intervening years we have been gathering ideas and particularly noting the queries that have come to the Botanic Garden on this perennially interesting subject. The greatest single need of the present, it seemed to our Committee, was for a well illustrated "dictionary of herbs." The 136 photographs reproduced here, together with the carefully selected factual material that accompanies them, is the Botanic Garden's way of answering that need.

To a botanist an herb is an herbaceous plant—one whose stem and leaves die entirely (down to the root) each autumn; they may be annual, biennial or perennial. In contrast, shrubs and trees are woody plants with stems and branches that live on year after year. To the gardener and amateur horticulturist, however, "herb" has a more specialized meaning and refers to the many plants (*mostly* herbaceous) whose leaves, flowers or other parts possess qualities of aroma or flavor that have led to their use in cooking, perfumes, etc. And at one time in the history of man, all medicines came from herbs. Indeed, pharmaceutical companies and others are today searching the world for plants whose chemical properties have made them medically useful to primitive peoples. Relatively recent examples are *Rauwolfia serpentina* from India, source of one of the most valuable and efficient tranquillizers and a South American plant, *Chondodendrum tomentosum,* used by natives to make the poison, curare. It yields a drug which relaxes muscles and is valuable in treating some kinds of spasmodic paralysis.

Although interest in herbs dates back to the ancient Greek and Sanskrit literature, the botanic gardens ("physic" gardens) of the 16th and 17th centuries gave the greatest impetus to scholarly study of these plants. Numerous herbals were printed at the time, and while these great books seem primitive and even mildly amusing to us today, they were the first codification of man's knowledge of this important subject. Our Library here has an impressive reference collection of early herbals, and one cannot study them without being impressed by the close link that then existed between botany and medicine. This close relationship continued well into the past century. One of the Botanic Garden's good friends, the late Frank Bailey, once told me that his father, who was a physician of the 1850s to 1880s, used to make his own medicines from herbs that he collected personally. This is still the practice in many parts of the world today, especially the eastern countries.

It is a special pleasure to acknowledge the friendly cooperation of the many people who have helped to make possible this Handbook on Herbs. The Committee from the New York Unit of The Herb Society of America, under Miss Elizabeth R. Van Brunt, has worked with enthusiasm with Editor Nelson. All concerned deserve our grateful appreciation. May readers everywhere gain from the superb effort the contributors have put forth to make this an outstanding and useful work on Herbs!

Sincerely yours,

George S. Avery jr.

AN ILLUSTRATED DICTIONARY OF HERBS

Roche

White flowers and fern-like leaves of yarrow.

Yarrow ***(Achillea millefolium)***

A native perennial growing 2 or 3 feet tall. The leaves are soft and feathery, the flowers small and white, in flat heads. There are varieties with pink or reddish blossoms, and some other species of yarrow have yellow flowers.

Use: The entire plant is sharply aromatic and has some use in medicine.

Horticultural Use: Delicate foliage and flowers of yarrow are attractive in borders. It has a tendency to become weedy, so must be kept within bounds.

Culture: Will grow in very poor, rocky soil, does best in full sun. It is most easily propagated by division.

Sword-shaped leaves of sweet flag.

Buhle

Sweet Flag *(Acorus calamus)*

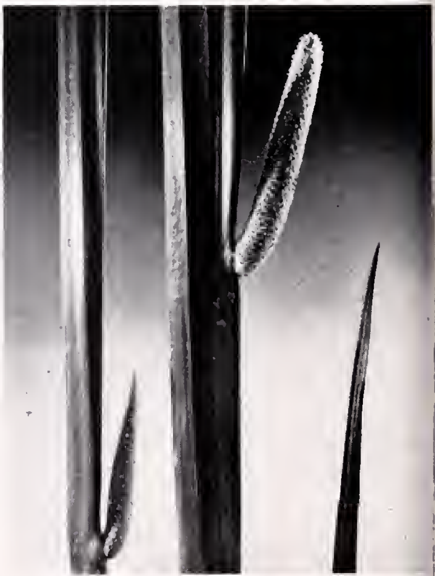
A native plant having slender, lily-like leaves as much as 6 feet long.

Use: Leaves and thick rootstalks have strong, aromatic, lemony odor and are used for sachets and flavoring. Roots can be candied. Also used in medicine.

Horticultural Use: Best grown in clumps and kept in background. Will grow in damp spots.

Culture: Thrives in wet soil and full sun, can be grown in drier places. Sweet flag is a hardy perennial, propagated by division.

Harvesting: Leaves can be used fresh; roots harvested in fall after plant dies down.



Flowering spikes of sweet flag resemble cones.

Roch

McFarland

Plant of chives in full bloom.

Chive (***Allium schoenoprasum***)

A small, dainty onion growing in clumps that reach about 10 inches high. Decorative light purple flowers.

Use: Leaves give a delicious onion flavor to foods.

Horticultural Use: Neat habit and attractive flowers make chives excellent as border plants.

Culture: Demands little care other than dividing on becoming over-crowded. Hardy perennials, chives are easily propagated by division or from seed.

Harvesting: The fresh leaves are cut for use as they grow.

Lavender flower heads of chives.

Roche

Garlic has flat leaves unlike those of many onions.

McFarland

Bulb sections of garlic are called cloves.

Garlic ***(Allium sativum)***

Garlic is one of the flat-leaved onions growing to about 2 feet. It has pinkis flowers in small heads.

Use: The bulbs, which break int small sections called "cloves," are a distinctive and well known flavoring i many types of cookery.

Horticultural Use: The leaves an flowers are not unattractive, but th plant has no special horticultural valu

Culture: Grows in any good garde soil. Perennial, propagated by sets.

Harvesting: Mature bulbs dug an dried.

Angelica is a tall, handsome plant with round flower heads. *Gottscho-Schleisner*

Angelica
(Angelica archangelica)

A large, handsome plant which may reach 6 feet in height. The spreading leaves are divided into three-parted leaflets; the small greenish flowers are borne in rounded clusters (umbels) on the tops of the stems.

Use: Oil from the roots, leaves or seeds is used in perfumes; the leaves and stalks can be used as a vegetable. The principle use, however, is as a condiment or confection, the hollow stems being candied for the purpose.

Horticultural Use: Best for bold accent plant or as background for other plants.

Culture: Angelica is generally treated as a biennial and grown from seed. These should be planted in the fall, or stratified. Does best in a rather moist soil and cool climate.

Harvesting: Young stems are best for candying, roots and leaves are collected the second year of growth, seeds when ripe in late summer.

Angelica atropurpurea is native to the United States. It can be used in ways similar to *A. archangelica.*

Dill plants in bloom.

Roche

Dill ***(Anethum graveolens)***

Bluish-green stems contrast with finely divided, yellow-green, plumelike leaves and yellowish flowers. Grows to about 2 or 3 feet.

Use: Leaves and seeds famous for flavoring pickles, and also useful in other cookery. Seeds yield a fragrant oil.

Horticultural Use: The finely divided light green leaves have a delicate, almost misty effect.

Culture: Dill is an annual that is easily grown from seed sown in spring after danger of frost. Should be sown in place, as it is not easy to transplant.

Harvesting: Leaves are best just as the flowers open. Seeds are picked when ripe.

Chervil ***(Anthriscus cerefolium***

An annual growing 2 feet or less i height, with lacy leaves something lik parsley but lighter green. Flat heads o delicate white flowers.

Use: Chervil is used much as parsle is, in soups, salads, etc.

Horticultural Use: Requires sem shade, so can be used in a shaded corn of the herb garden.

Culture: Raised from seed sown ear in spring.

Harvesting: The fresh leaves are c for use when large enough.

Plants of southernwood have feathery texture.

Southernwood, Old Man *(Artemisia abrotanum)*

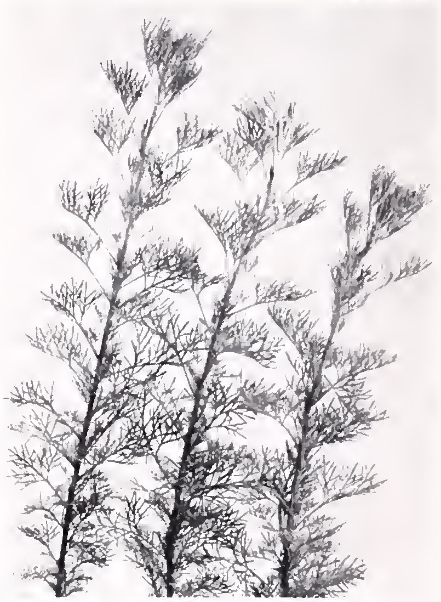
Semi-shrubby plant from 2 to 5 feet tall, with finely divided, grayish-green, pungent-smelling leaves.

Use: Grown mostly for looks and the scent of its leaves, which were once thought to keep moths away. Has limited use in medicine.

Horticultural Use: Good accent plant in herb garden or perennial border.

Culture: Southernwood is a hardy perennial most easily propagated by division. Endures city conditions well. Does best in full sun.

McFarland



Finely divided foliage of southernwood has pungent fragrance.

McFarland

Foliage and flowers of wormwood.

Wormwood (*Artemisia absinthium*)

A handsome, but rank-growing perennial, 2 to 4 feet tall. It has lobed, silky-gray leaves and minute, inconspicuous greenish-yellow flowers.

Use: Most famous as an ingredient of the liqueur absinthe and has limited use in medicine.

Horticultural Use: Provides a fine strong, gray accent in the garden.

Culture: Wormwood is a hardy perennial, easily grown from seed or cuttings. Has tendency to spread and toward end of season may sprawl, so should be tied back. Does best in sun, will grow in poor soil.

Other Artemisias

There are a large number of artemisias useful in the garden. Among the better known are Roman wormwood (*A. pontica*) with very finely cut, silvery foliage and old woman or dusty miller (*A. stelleriana*) with equally gray, lobed leaves. Both are good edging plants if kept in bounds. *Artemisia schmidtiana* has soft, much divided, silver-gray foliage. It grows to about 2 feet, but a dwarf form is listed.

Culture: These artemisias are also hardy perennials, but may need some protection in northern states.

Roche

Artemisia schmidtiana has soft textures and beautiful gray color.

Tarragon plant.

Tarragon
(Artemisia dracunculus)

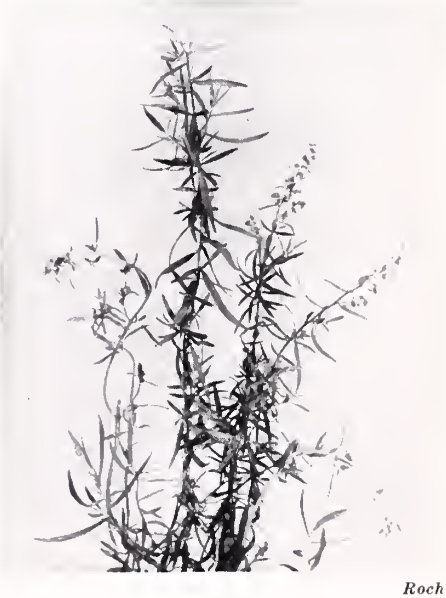
Quite different in appearance and use from other artemisias, tarragon is an herbaceous perennial about 2 feet tall, much branched, with narrow somewhat twisted green leaves.

Use: The leaves of tarragon have a distinctive flavor a little like that of anise and are used in salads and other cookery. They yield their flavor to vinegar in which they are steeped.

Horticultural Use: No outstanding horticultural value.

Culture: Will grow in full sun, but seems to do better with a little shade. Propagated from root cuttings or by division. Protect in winter in cold climates.

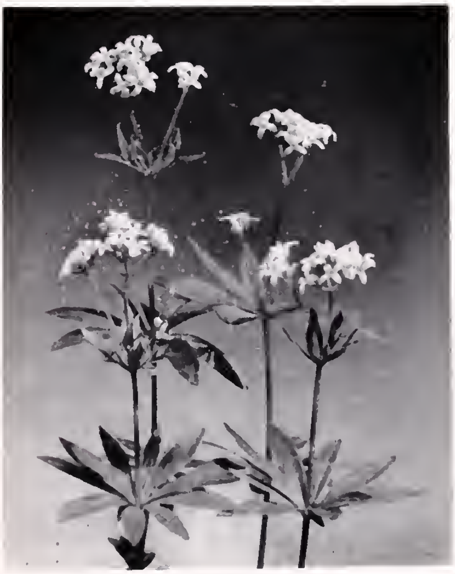
Harvesting: Young leaves and stem tips are best to use fresh or to flavor vinegar. Flavor lost on drying.



Roche

Tarragon leaves.

Sweet woodruff makes a dainty carpet on ground. Roch



Roche

Whorled leaves and white flowers of woodruff.

Sweet Woodruff
(Asperula odorata)

Low, spreading plant forming clump about 8 inches high. The slender leave are borne in starry whorls; the flower are very small and white, in loos clusters. The plant when crushed an especially when dried has a sweet scen of new-mown hay and vanilla.

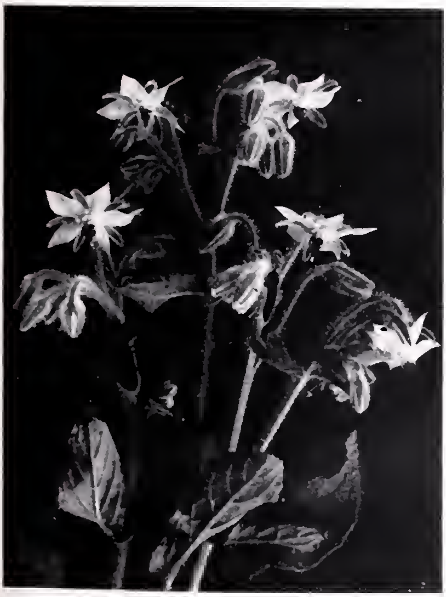
Use: The most famous use is fo flavoring the German May-wine, an it can be used in other drinks.

Horticultural Use: Woodruff make a charming ground cover under tall plants.

Culture: Can be grown as a perenni if winters are not too severe. In col climates plants may be kept indoors o in cold frame over winter. Will thrive i half-shaded places.

Harvesting: Plants are harvested an dried in spring, when fragrance strongest.

Borage is a rough-textured plant. *McFarland*



McFarland

Star-shaped flowers of borage are a beautiful blue color.

Borage *(Borago officinalis)*

A decorative annual, with coarse, very hairy leaves and stems and beautiful sky-blue, starry flowers. It grows 2 to 3 feet tall.

Use: Flower sprays and leaves are used to impart a cool, cucumberlike flavor to summer drinks. It is said to be a good bee plant.

Horticultural Use: Valued chiefly for the beautiful color of the flowers. There are white and reddish-purple varieties.

Culture: Easily grown from seed and will self-sow. Does best in dry sunny places.

Harvesting: The blossoms are picked as they open. The leaves are used fresh at any time; they are very seldom dried.

Roche

Calendulas are common garden flowers as well as herbs.

Buhle

Calendula flowers.

Calendula, Pot Marigold *(Calendula officinalis)*

A decorative annual, often grown in flower gardens. It grows from 1 to 2 feet tall, and has flat, round, many rayed, yellow to orange flower heads.

Use: The petals of the flowers impart their yellow color and a subtle aromatic flavor to foods with which they are cooked. A tincture was formerly used in medicine.

Horticultural Use: Much prized for the brilliance of the blossoms.

Culture: Easily raised from seed after danger from frost is over. Will self-sow. Does best in bright sun.

Harvesting: The flowers are cut when fully open and the "petals" (actually florets) separated and dried in a shady place.

McFarland

Caraway plants in bloom resemble carrots.

Caraway (*Carum carvi*)

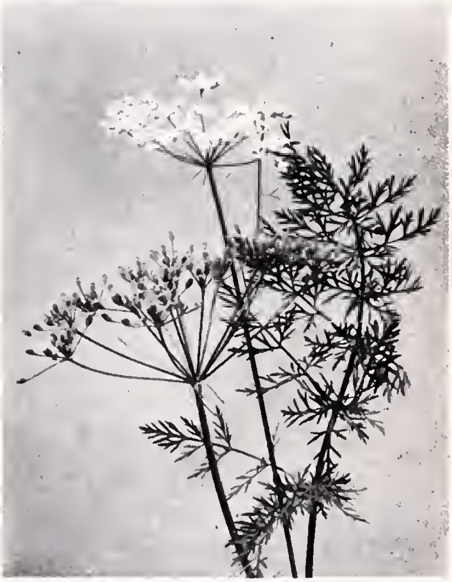
A biennial growing about 30 inches tall. The flowers are borne in flat white clusters and, like the finely cut leaves, resemble those of carrot.

Use: The seeds of caraway have a warm, aromatic odor and flavor and are popular in cooking. The oil is an important ingredient in liqueurs such as kümmel.

Horticultural Use: Caraway has no special horticultural value, although the lacy leaves and flowers are rather attractive.

Culture: Easily raised from seed. Plants usually do not bear seed first year they are planted, but if started in fall will bear the following year.

Harvesting: Seeds picked when ripe.



Gottscho-Schleisner

Seeds and flowers of caraway.

Large, fragrant leaves of costmary.

Bible Leaf, Costmary *(Chrysanthemum balsamita)*

Perennial that may grow to as much as 5 to 6 feet, with leaves 5 or 6 inches long and about 1½ inches wide. They are light green, with small teeth on the margins and have a pleasant, camphory, mint-like fragrance. Flowers like small daisies.

Use: Leaves used for tea, and for their fragrance. They are also suppose to be useful as a moth preventive.

Horticultural Use: Best kept in th background as it grows large and i somewhat coarse.

Culture: Bible leaf is hardy and easil cultivated by division. Does well in average soil, in dry sunny place.

Harvesting: Young leaves are cut before the plant flowers.

Coriander plants.

Coriander

(Coriandrum sativum)

A dainty annual growing to about 2 feet. The leaves are very finely divided, ill-smelling and tasting. Small white or purplish-tinged flowers in small flat heads.

Use: The globular seeds, about 1/8 inch in diameter, have a delicious perfumed taste and odor and are used as a condiment and in confections.

Horticultural Use: Attractive in clumps when in flower.

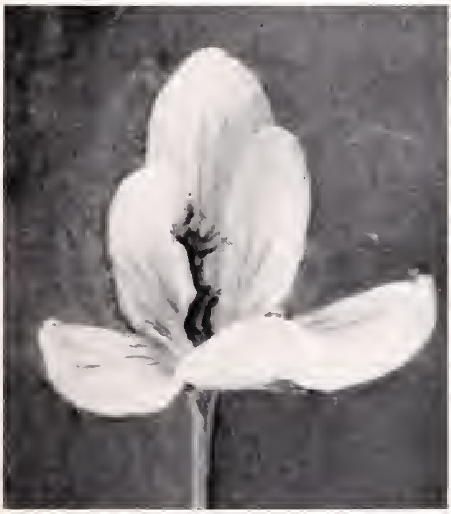
Culture: Easily grown from seed sown in spring. Does well in any good garden soil.

Harvesting: Seeds are picked when mature, before they fall.

Lacy flower head of coriander.

Roche

Saffron crocus blooms in autumn.



McFarland

Saffron is the dried stigma from the center of the saffron crocus.

Saffron Crocus (*Crocus sativus*)

A small, autumn-flowering crocus with lavender flowers having a bright orange stigma. Beginners should not confuse it with the much larger colchicum which is also sometimes called autumn crocus and is poisonous.

Use: The orange stigmas when dried constitute saffron, widely used in cooking for its color and flavor.

Horticultural Use: Attractive as a welcome note of late color in the herb garden.

Culture: Grown from bulbs planted 4 inches deep in spring. Need protection in the north.

Harvesting: Flowers picked as soon as open and stigmas removed and dried.

Clove pink.

Clove Pink
(Dianthus caryophyllus)

Perennial, with jointed stems and blue-green, grass-like leaves and small carnation-like flowers. The fragrance of the flowers is penetrating and spicy, resembling cloves.

Use: Flowers are prized for their fragrance and used to flavor wine and vinegar.

Horticultural Use: Clove pink is a useful plant for a low border.

Culture: Can be propagated from seeds, cuttings, or by layering. It is hardy, but needs protection in cold climates. Should have good drainage.

Blossom of clove pink has spicy fragrance.

McFarland

Foxglove is a commonly grown perennial.

Foxglove ***(Digitalis purpurea)***

Biennial producing a flower stalk up to 4 feet tall, with rosette of large, pebbly-textured leaves at base. Flowers are long bell-shaped, purple or white with spotted throats.

Use: Leaves are source of important drug, digitalis.

Horticultural Use: Both flowers and foliage highly ornamental; good for use in back of border.

Culture: Grown from seed, plants flower second year. In cold climates plants need protection over winter.

Harvest: Second-year leaves are collected and dried for commercial use.

Spotted, bell-like flowers of foxglove.

Sweet Fennel
(*Foeniculum officinalis*)

This fennel is an annual growing to about 3 or 4 feet. The leaves are finely divided into thread-like segments, light green in color.

Use: The seeds are used as a condiment, the leaves for their anise-like flavor, and the stems can be eaten like celery.

Horticultural Use: No special value, but the leaves are attractive.

Culture: Grows easily from seed planted in spring.

Harvesting: Seeds are picked when ripe; the best stems for eating are the tender flower stalks, just before blossoming.

Other fennels: Florence fennel (*F. dulce*) is used as a vegetable, the thickened, bulbous leaf bases being cooked or eaten fresh. Bitter fennel (*F. vulgare*) is a perennial used much as the others are.

McFarland

Seeds and flowers of fennel.

Roche

American pennyroyal.

American Pennyroyal
(*Hedeoma pulegioides*)

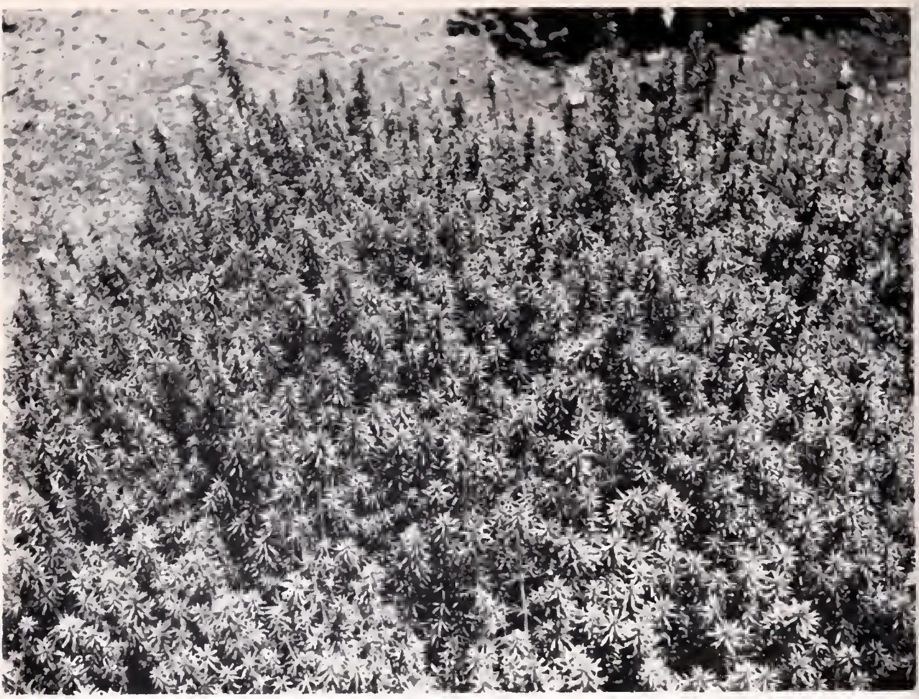
A small, branching native annual that grows to about 18 inches. It has the mint-like odor of true pennyroyal.

Use: Used like true pennyroyal to make a tea for coughs and colds.

Horticultural Use: No particular horticultural value.

Culture: Does best in light shade. Grown from seed.

Harvesting: The whole plant is cut and dried just before flowering.



Lady's bedstraw makes attractive ground cover, but must be kept clipped or it becomes untidy.

Leaves of bedstraw are in whorls like those of woodruff.

Lady's Bedstraw

(Galium verum)

Dainty perennial with narrow leave about an inch long in starry whorls o weak, partly prostrate stems. It has loos clusters of very small yellow flowers.

Use: Can be used to stuff mattresse and as a substitute for rennet in curdling milk.

Horticultural Use: Attractive groun cover, especially early in the season becomes unkempt later in the season unless it is kept clipped to about 3 inches

Culture: Grows well in any good garden soil. Propagated by division.

Hyssop plant.

Hyssop ***(Hyssopus officinalis)***

A hardy perennial growing to not more than about 2 feet, with woody stems, small pointed leaves, and spikes of small purple flowers. There are forms having pink or white flowers.

Use: The pungent leaves are used to flavor liqueurs and sometimes as a condiment. Oil obtained from them is used in perfumery.

Horticultural Use: Because it can be clipped, hyssop makes a good border plant or small hedge.

Culture: Will grow in rather poor soils and is easily propagated from seed. When established it is quite hardy.

McFarland

Flowers of hyssop.

Large, yellow blossoms of elecampane.

Elecampane ***(Inula helenium)***

One of the largest plants used in the herb garden, growing 4 to 6 feet tall, with big rough leaves and bright yellow, daisy-like flowers as much as 4 inches across.

Use: The roots of elecampane are very bitter and aromatic and are used to flavor some liqueurs and as a cough remedy when candied.

Horticultural Use: Best used as background plant or large specime plant.

Culture: Elecampane is quite hard and grows best in a fairly deep mois soil, in full sun. It is propagated b division or grown from seed.

Harvesting: Roots are dug and drie in autumn.

McFarland

Florentine variety of German iris is one source of fragrant orris root.

McFarland

Flowers of German iris.

Orris Root (*Iris germanica* var. *florentina*)

The blossoms of this variety of iris are a very pale lavender, almost white.

Use: The thick rootstocks provide the orris root of commerce. They are used in perfumery as a fixative of other scents, and for their own violet odor.

Horticulture Use: In borders, clumps or beds in the herb garden this iris with its broad sword-like leaves and large flowers is a welcome contrast to the many dainty, small-flowered herbs.

Culture: Grows best in full sun and a well-drained, rather dry situation. Propagated by division in late summer.

Harvesting: The rootstalks are dug, peeled and dried in the sun after blossoming.

McFarlan

Laurel trees are often clipped into geometric shapes.

Laurel leaves are familiar to cooks as bay leaves.

Laurel, Bay Leaf
(Laurus nobilis)

An evergreen tree which may reac 40 feet in height in its native Mediterranean region but is usually from 4 t 10 feet high and grown in containers i colder climates. It is the true laurel use for victory wreaths in classical Gree and Roman times.

Use: The glossy evergreen leaves ar known to all cooks as bay leaves, use extensively in cooking.

Horticultural Use: Principally used a accent or specimen plants in tubs o boxes. Can be clipped.

Culture: Must be taken indoors i winter in any but semitropical climate Requires rather rich, moist soil. Propagated from cuttings.

Harvesting: Mature leaves can b picked and dried for use at any time.

Gottscho-Schleisner

Lavender plants in bloom.

Lavender
(*Lavandula officinalis*)

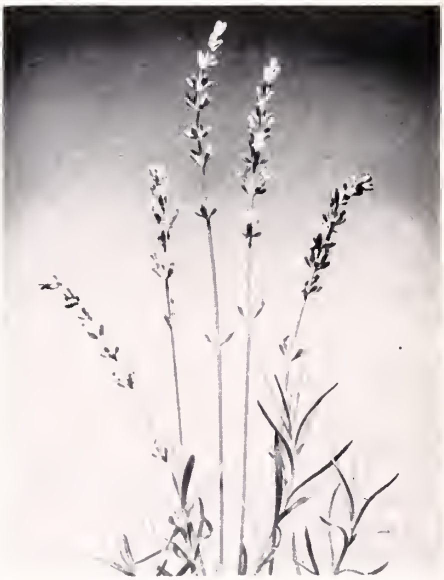
A much-branched, somewhat woody perennial growing to 1½ to 3 feet. The narrow leaves are about 2 inches long, and are a pleasing gray-green color. The small lavender flowers are borne on long-stemmed, slender spikes.

Use: One of the most famous of all herbs for the fragrance of its dried flowers and the oil distilled from them. Much used in sachets and perfumes.

Horticultural Use: Small varieties are good border plants, larger ones for unclipped hedges.

Culture: Grows best in rocky, dry, sunny places with plenty of lime in the soil. Propagated by seed or cuttings. If winters are severe, it should be protected.

Harvest: The whole flower spikes are cut when the first flowers begin to open and dried.



Roche

Spikes of lavender flowers.

Lovage.

Lovage *(Levisticum officinale)*

A hardy perennial herb with large rich green leaves that resemble those of celery in appearance and taste, but stronger and sweeter.

Use: Leaves and stems give a celery flavor to soups and salads. Stem bases can be blanched and eaten.

Horticultural Use: Forms large clumps as much as 3 or 4 feet tall. Good background for smaller plants.

Culture: Does best in a rich, fairly moist soil. Propagated from seeds planted in late summer.

Harvesting: Leaves can be used fresh or dried at any time.

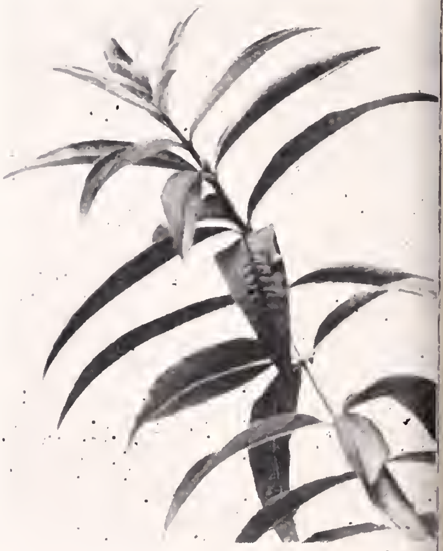
Lemon-verbena *(Lippia citriodora)*

A tender, woody shrub which in warm climates may reach 10 feet but is usually much smaller. In temperate climates it must be taken indoors in winter. The crisp, narrow, shiny leaves are strongly lemon-scented.

Use: The leaves are used for their fragrance and to give a lemony taste to teas, cold drinks, jellies, etc.

Horticultural Use: No special horticultural value; may be used as pot or tub specimens.

Culture: Will grow in any good garden or potting soil. Propagated from cuttings. Bring indoors at first signs of cold weather.



Gantn

Lemon-verbena.

Leaves and flower heads of sweet marjoram.

Sweet Marjoram
(*Majorana hortensis*)

One of the most fragrant and popular of all herbs. It is low and spreading, reaching about 8 to 12 inches in height, with small, oval, gray-green leaves that are velvety to the touch.

Use: The fresh or dried leaves are widely used as a flavoring in cooking. Oil is used in perfumery.

Horticultural Use: Gray color of foliage contrasts well with brighter greens. Can be used in borders.

Culture: Easily grown from seed or cuttings. In the North it is best treated as an annual or kept over winter as a pot plant. In the South it is perennial.

Harvesting: Use fresh at any time; cut leafy stems at flowering time and dry for future use.

Pot Marjoram
(*Majorana onites*)

Differs from sweet marjoram in being hardier and in having slightly larger leaves without stalks. The scent and flavor are somewhat more thyme-like than those of sweet marjoram.

Use: Same as for sweet marjoram.

Horticultural Use: No particular horticultural value.

Culture: Grows best in a light limestone soil. Hardy in the vicinity of New York City, it should be taken indoors where winters are very severe. Propagated from seed or by division.

Harvesting: Same as for sweet marjoram.

Horehound plants in bloom. *Gottscho-Schleisne*

McFarland

Woolly gray leaves of horehound.

Horehound ***(Marrubium vulgare***

Somewhat coarse perennial, the enti plant covered with a whitish down. Th leaves are crinkled and tend to tur downward.

Use: Horehound is the source of th familiar old-fashioned horehound cand

Horticultural Use: The gray color c the plant provides a striking accen Because of its weediness it is best ke toward the back of a planting.

Culture: Grows well in light soil, wit stands full sun and intense heat. Hard but should be protected in very co climates. Propagated from seed, cu tings, or by division.

McFarland

Plant of balm.

Balm ***(Melissa officinalis)***

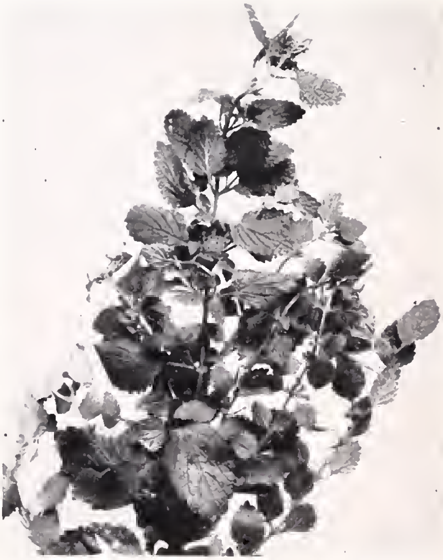
A somewhat weedy perennial growing to about 2 feet in height. The entire plant has a strong lemon scent.

Use: The leaves are sometimes used for tea, and sprigs are put into cool drinks to impart a lemony taste. Oil from the leaves is used in perfumes.

Horticultural Use: Balm is best planted where it is not too conspicuous because of its weedy habit. It has a tendency to spread and must be kept within bounds.

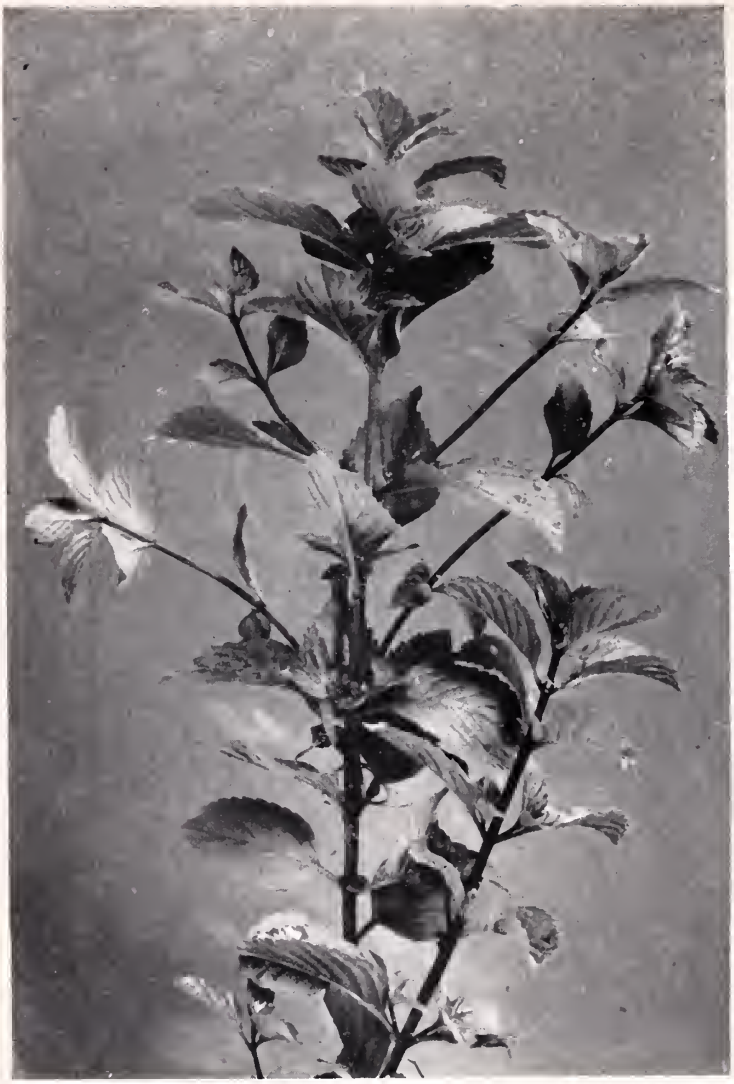
Culture: Thrives in poor soil in a warm, sunny spot. Can be propagated from seed sown in spring, or by dividing.

Harvesting: Leaves and sprigs are picked in the morning whenever plants are large enough and used fresh or dried.



McFarland

Leaves of balm have strong lemon fragrance.



Leaves of peppermint are borne on short stalks. *McFarland*

Peppermint ***(Mentha piperita)***

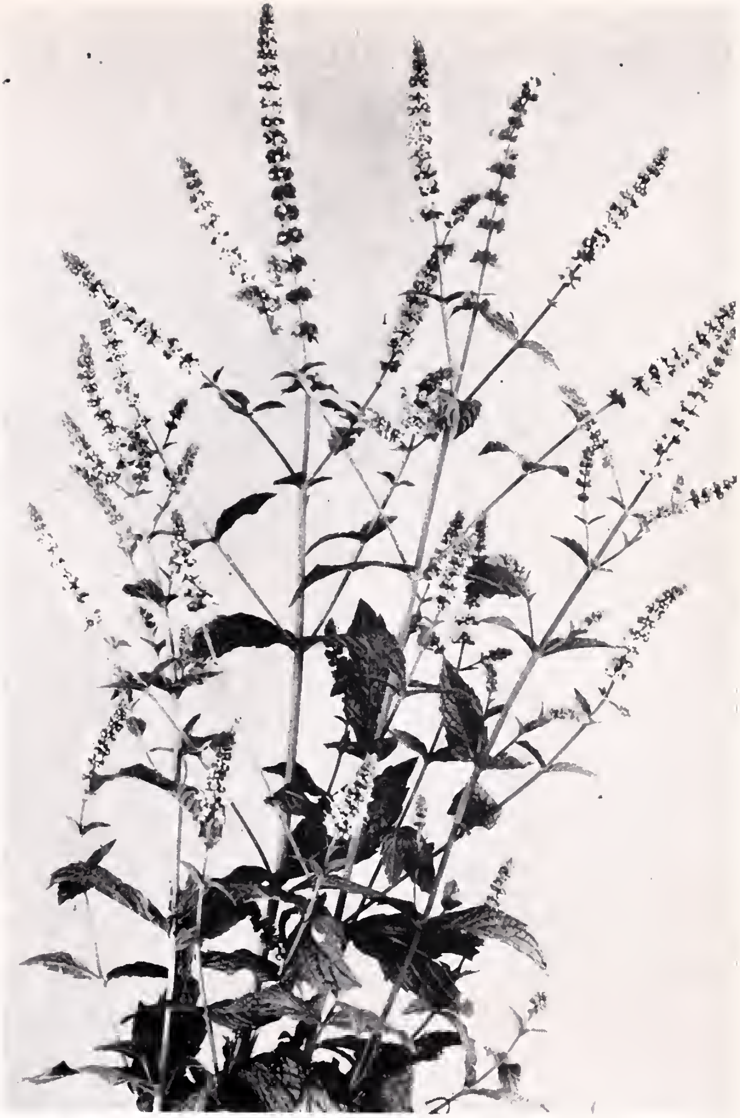
Perennial with spreading rootstalks and numerous upright stems 2 feet or more tall. Dark green leaves and reddish-tinged stems have a characteristic warm spicy scent.

Use: Leaves used for tea and flavoring. Oil from the plant is used in confectionery and medicine and is the source of menthol.

Horticultural Use: No special value as an ornamental.

Culture: Does best in a rich, moist soil. Fairly hardy except where winters are severe. Propagated by division or cuttings.

Harvesting: Fresh leaves used at any time. Leaves to be dried are best taken just as flowering commences.



Spearmint flowers are in spikes at top of plant. *McFarland*

Spearmint ***(Mentha spicata)***

Crisp-looking perennial with pointed, slightly crinkly leaves, lighter green than those of peppermint. The whole plant has a sweet characteristic odor.

Use: Leaves are used to flavor cold drinks, in teas, and to make mint sauce. Oil is used in confectionery.

Horticultural Use: No outstanding value, although its rich green color is pleasing.

Culture: Grows best in a somewhat moist soil. Propagated by cuttings or divisions. Hardy.

Harvesting: Fresh leaves and leafy stem tips picked any time. For drying, it is best cut just as flowering begins.

Minute size of Corsican mint leaves is shown by match stick.

Corsican Mint (*Mentha requieni*)

A delightful little creeping plant with minute rounded leaves, forming an almost moss-like mat. When lightly brushed it emits a very strong, pleasing odor of mint. It is sprinkled in late summer with little lavender blossoms.

Use: Reportedly used to flavor liqueurs.

Horticultural Use: Delightful as a ground cover for small spots.

Culture: Thrives in moist shade, but will also grow in sun. Will not survive cold winters unless well covered by snow; advisable to keep indoors in pots over winter. Propagated by division.

Pennyroyal (*Mentha pulegium*)

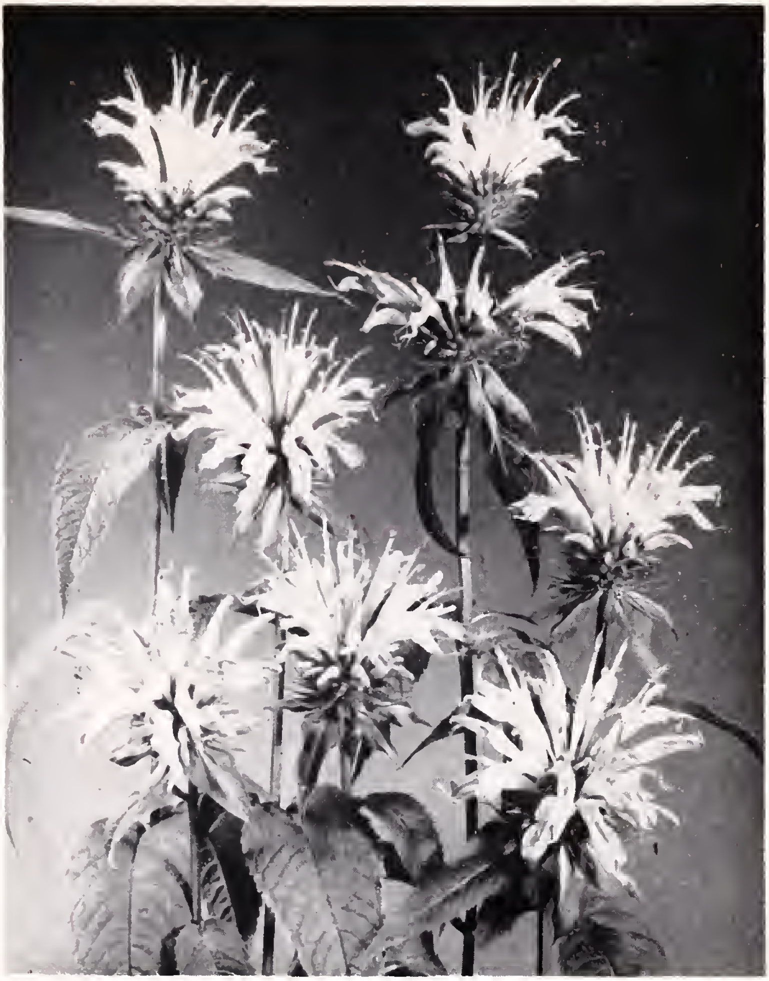
Prostrate perennial with small oval leaves and creeping stems. It has a very pungent peppermint-like scent.

Use: Pennyroyal is used to make a tea for coughs and colds. The plant contains principles poisonous to some people so should be used with caution.

Horticultural Use: Could be used as a ground cover, but is somewhat weedy in appearance.

Culture: Easily propagated by division. Needs renewal every few years. It is a tender perennial which should be taken in over winter in cold climates.

Pennyroyal is a semi-creeping mint.



Flowers of bee-balm are a bright, soft red. *Roche*

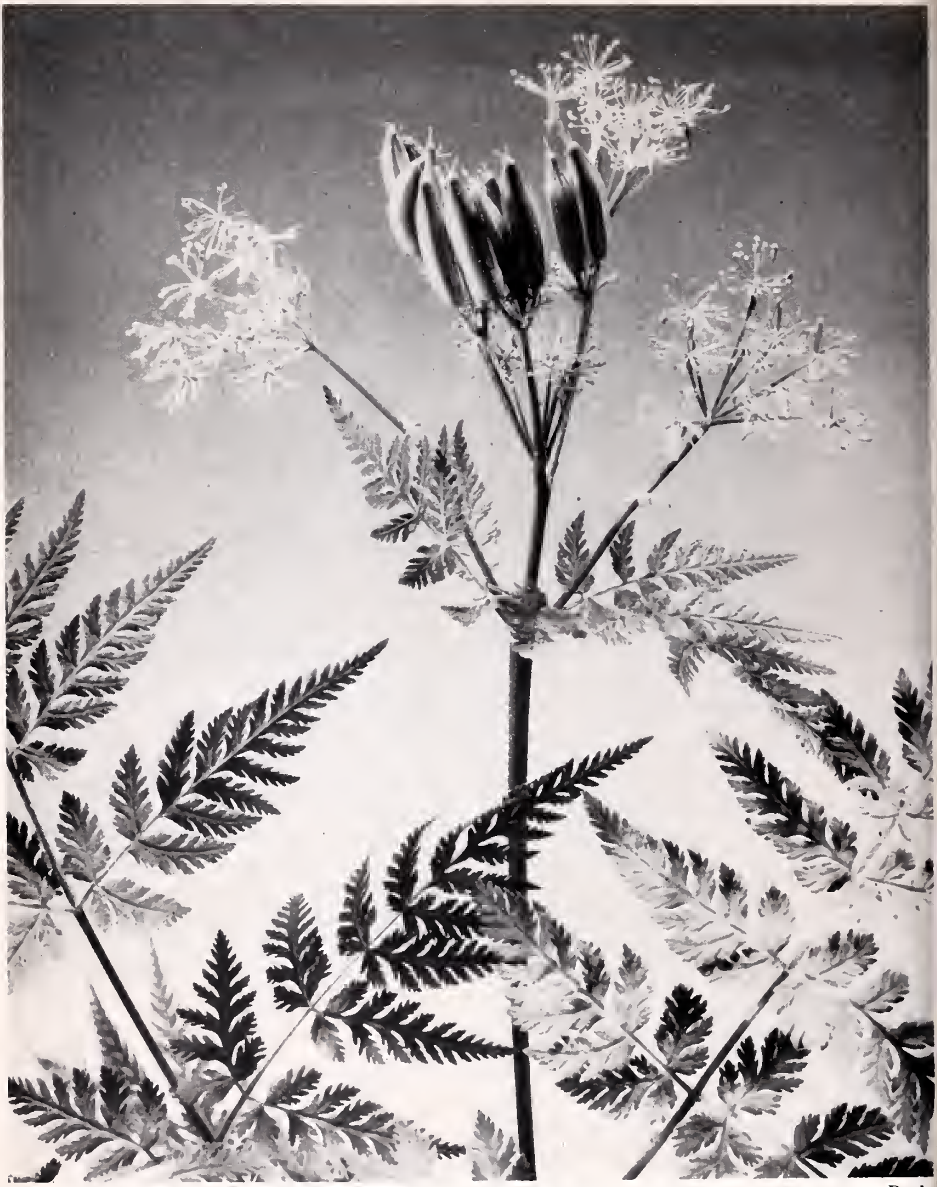
Bee-balm ***(Monarda didyma)***

A handsome perennial that grows to about 4 feet, with beautiful scarlet flowers in round heads. The leaves have a pungent lemony scent resembling bergamot mint.

Use: Bee-balm makes an aromatic tea.

Horticultural Use: The plants make strong clumps and the blossoms provide a welcome splash of color in the herb garden. There are varieties with magenta and deep red flowers. Wild bergamot (*M. fistulosa*) is very similar but has lavender flowers and there is a white-flowered form.

Culture: Hardy and will grow in sun or light shade. Propagated by division or grown from seed.



Leaves of sweet cicely resemble ferns. *Roche*

Sweet Cicely ***(Myrrhis odorata)***

A very decorative perennial with downy, fern-like leaves and umbels of white flowers. It grows 2 to 3 feet tall.

Use: The green seeds have a spicy taste and are mixed with other herbs. They are used in certain liqueurs.

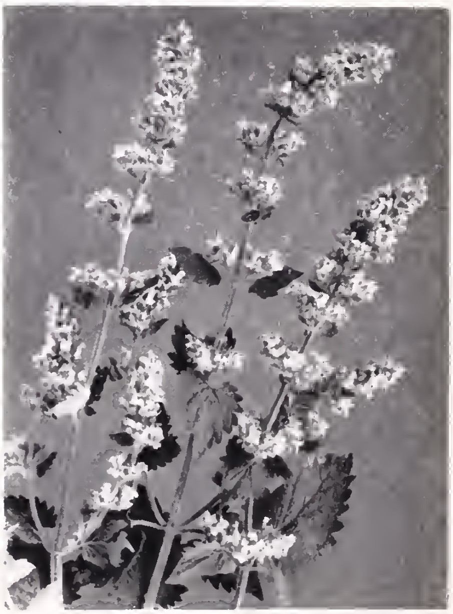
Horticultural Use: The delicate leaves and flowers are attractive and have a light airy appearance.

Culture: Grows best in partial shade Seeds are planted in fall of the year o stratified.

Harvesting: Seeds are picked green and used fresh.

McFarland

An ornamental *Nepeta* bordering steps.



McFarland

Catnip blossoms.

Catnip ***(Nepeta cataria)***

A hardy perennial growing to 3 or 4 feet tall. The heart-shaped leaves are green above, grayish below. Purplish flowers.

Use: Beloved by cats and occasionally used for medicinal teas.

Horticultural Use: When young the plants are decorative, but as they grow older they are scraggly, so should be kept in the background. There are other species of *Nepeta* which have greater ornamental value.

Culture: Hardy, will grow in sun or shade. Grown from seed or propagated by division.

Harvest: The leafy tops and leaves may be cut and dried when mature.

Basil. *McFarland*

Sweet Basil ***(Ocimum basilicum)***

A pretty annual, about 18 inches tall, with light green rather broad leaves. The flowers are small and white, in spikes. There are several species of basil in cultivation, at least one having attractive purple leaves.

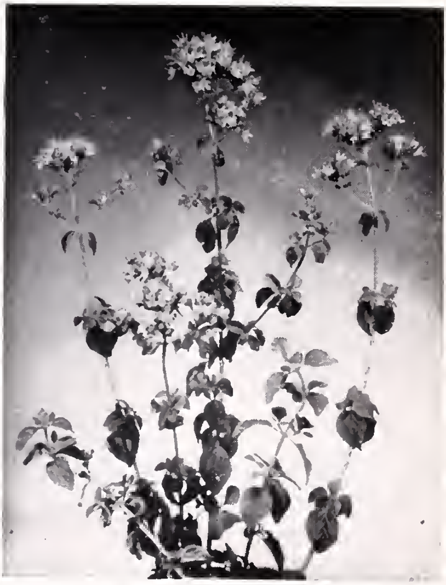
Use: The spicily scented leaves are one of the most popular of all herbs used in cooking. They are considered especially good with tomato dishes, and are used fresh or dried.

Horticultural Use: The light green leaves are attractive, especially while the plants are young, and the purple-leaved kind gives an interesting color in the herb garden.

Culture: Grows easily from seed planted when danger of frost is over.

Harvesting: Green leaves can be picked about six weeks after planting. For drying, it is best to cut them just befor the flowers open.

Wild marjoram.



Roche

Flowers and leaves of wild marjoram.

Wild Marjoram *(Origanum vulgare)*

Hardy perennial with sprawling stems which may become 2 feet high. Much coarser than sweet marjoram, it smells more like thyme. Small pink or white flowers.

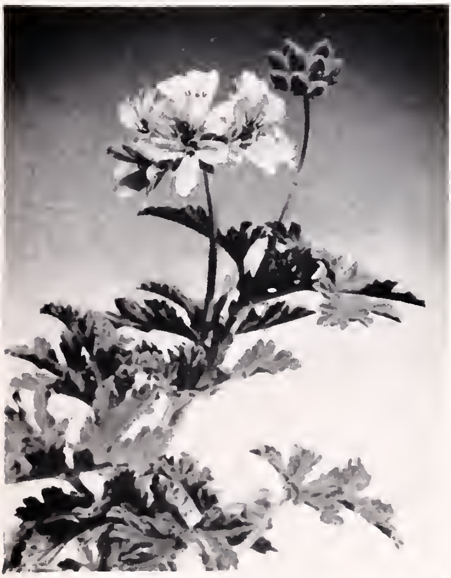
Use: The leaves are used as a flavoring in cooking but most people do not consider them as good as sweet marjoram leaves.

Horticultural Use: Weedy sprawling habit makes this plant of little value as an ornamental, but the flowers are pleasantly fragrant.

Culture: Grows well in poor soil, propagated by seeds or divisions.

McFarland

When given plenty of space rose geranium plants become quite large.



Roche

Flowers of rose geranium.

Rose Geranium *(Pelargonium graveolens)*

Tender perennial which must be wintered indoors in most of the United States. Where it can be grown outside the year around it may reach a height of 4 feet, but it is usually much smaller than this. The leaves are lobed and cut, rough to the touch, and smell of roses with an overtone of spice.

Use: The plants are grown commercially for the fragrant oil distilled from them. The leaves are used to give a rose flavor to desserts and jellies.

Horticultural Use: Rose geraniums are often used as pot plants, set in the garden in warm weather. The small lavender flowers are attractive but not showy.

Culture: Do well in any good garden soil, need sun. Propagated from cuttings.

Harvesting: The leaves can be cut at any time from mature plants.

Gray, woolly leaves of peppermint geranium.

Peppermint Geranium (*Pelargonium tomentosum*)

This geranium has gray-green, velvety, shallowly lobe leaves that smell strongly of peppermint.

Use: Peppermint geranium is used in potpourris and in cooking to give a peppermint flavor to jellies, desserts, etc.

Horticultural Use: Attractive bedding or pot plants.

Culture: Similar to that for rose geranium.

Geranium 'Clorinda' (*Pelargonium* variety)

Of all the scented geraniums this variety has the most showy flowers. They are a glowing cerise with orange tones, and resemble those of the familiar fish or zonal geraniums. The plants are compact, with large three-lobed leaves that have a pleasant, pungent scent.

Use: This geranium is grown only for its ornamental value.

Horticultural Use: As a pot or specimen plant 'Clorinda' is useful for its brilliance. It should be used carefully, however, as its intense color does not blend readily with many other colors.

Culture: Same as for other scented geraniums.

Parsley used as border for bed of annuals. *McFarland*

Parsley (*Petroselinum crispum*)

A hardy biennial usually treated as an annual. Grown for its much divided, sometimes curly leaves which have a characteristic odor and flavor.

Use: One of the most familiar of all herbs, used as flavoring and for garnish.

Horticultural Use: The beautiful green leaves and compact habit of parsley in its first year of growth make it a good plant for edging.

Culture: Grown from seed started in early spring. Slow to germinate.

Harvesting: Cut any time when large enough. Leaves are used fresh, or they may be dried in a slow oven (about 150°F.) until crisp.

Familiar much cut, curl leaves of parsley.

Gantne

McFarland

Flower heads of anise.

Anise ***(Pimpinella anisum)***

A dainty annual that grows from 1½ to 2 feet high. It has lobed leaves, finely cut, and very small whitish flowers in flat clusters. The leaves and seeds have a warm sweet taste suggestive of licorice.

Use: The leaves are used in salads and as a garnish. The seeds are used to flavor confections, cakes, cookies, etc. Oil from the seed is used in medicine.

Horticultural Use: Attractive in the herb garden, but of no great ornamental value.

Culture: Grows readily from seed planted after danger of frost is past.

Harvesting: The green leaves can be cut whenever the plants are large enough. The seeds are gathered as soon as they ripen, dried and stored in tight containers.

McFarland

Damask rose.

Rose **(*Rosa* spp.)**

Roses are not herbs, strictly speaking, but because of the beauty they bring to the herb garden, and because of the long use made of them in cooking and perfumery, they are usually included among the herbs. Those roses notable for their fragrance are the ones most appropriate for the herb garden, and among these the damask rose (*Rosa damascena*) is outstanding. Others are the French rose (*R. gallica*), cabbage rose (*R. centifolia*) and some rugose roses (*R. rugosa*).

Use: Petals are the source of attar of roses, and are used in potpourris, to make jams and jellies, and to give delicate flavor to various desserts. Hips are used for jam.

Horticultural Use and Culture: See PLANTS & GARDENS, Summer, 1955.

Harvesting: Petals should be gathered on sunny day after dew is gone and when flowers are at height of bloom.

Rosemary grows into a vigorous shrub in mild climates. *McFarland*

Rosemary
(Rosmarinus officinalis)

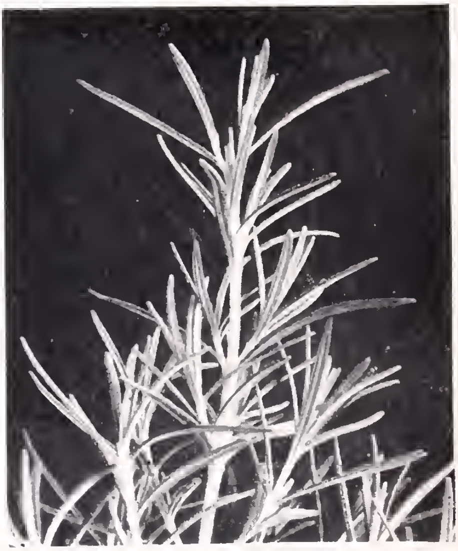
Half-hardy perennial which is best taken indoors and kept as a pot plant over winter where climates are severe. Grows out-of-doors the year around in mild climates and may reach 3 to 6 feet. The narrow leaves are rather leathery and have a spicy, resinous fragrance.

Use: A very popular flavoring for meats, dressings, etc. An oil from the leaves is used in medicine.

Horticultural Use: In warm climates rosemary can be used as a hedge. Makes a good specimen plant for growing in pot or tub.

Culture: Grows best in well-drained, sunny situation, in soil containing lime. Propagated by cuttings and can be grown from seed.

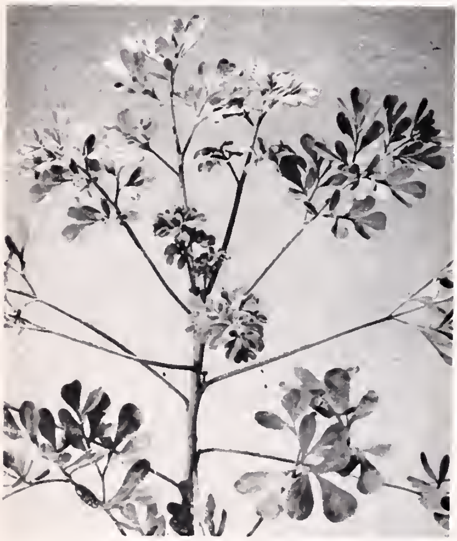
Harvesting: Fresh leaves cut at any time; for drying they are best taken just before plant blooms.



Leafy twig of rosemary.

McFarland

Plants of rue in flower.



Roche

Leaves of rue somewhat resemble maidenhair fern.

Rue ***(Ruta graveolens)***

Handsome, somewhat woody perennial with much divided blue-green leaves and small yellow flowers. It is fairly hardy, often being killed back in winter but springing up again from the roots.

Use: The bitter, musty-flavored leaves are aromatic and can be used in sandwiches. They should be used with caution as they contain certain poisons, and some people develop blisters on the skin just from contact with the plant in hot weather. At one time rue had some use as an antiseptic.

Horticultural Use: Blue-green color of foliage contrasts well with other greens in the garden. Flowers not showy but have a certain charm.

Culture: Does best in a well-drained but moist soil. Propagated from seeds.

McFarland

Common sage.

Sage ***(Salvia officinalis)***

Woody hardy perennial with oblong, woolly, gray-green leaves, light below, darker above. Sage grows to 2 feet or more in height and has a tendency to sprawl.

Use: One of the most familiar of seasoning herbs, used with meats, dressings, etc.

Horticultural Use: If cut back from time to time sage is an attractive plant. There are dwarf forms useful for edging.

Culture: Does best in a light, well drained soil in a sunny spot. Grows easily from seeds or cuttings.

Harvesting: Leafy tops of stalks are cut about 5 inches long before flowering, hung in open shade until dry.

Roche

Sage leaves have unusual, pebbly texture.

Gottscho-Schleisner

Pineapple sage.

Pointed leaves of pineapple sage are deliciously fragrant.

Pineapple Sage ***(Salvia rutilans)***

A tender perennial which must be wintered over in pots indoors in cold climates. The semi-woody stems may grow to over 4 feet high. The rough, pointed leaves have a delicious pineapple scent Inch-long, tubular flowers of a beautiful cardinal-red appear in late summer.

Use: The fragrant leaves are good in potpourris and give a pleasing flavor to cold drinks such as iced tea.

Horticultural Use: Because of its height and tendency to be scraggly, pineapple sage is best planted in the background.

Culture: Does well in any good garden soil. Propagated from cuttings which will root in water.

Harvesting: Fresh leaves can be picked and dried at any time.

Clary sage is a large, handsome plant. *McFarland*

Clary Sage *(Salvia sclarea)*

This sage is a biennial, with large, pebbled, scalloped leaves as much as 9 inches long at the base of the plant, becoming smaller as they ascend the 3-foot flowering stalk. The flowers are whitish, in spikes with pinkish or lavender bracts. They have a strong aromatic odor.

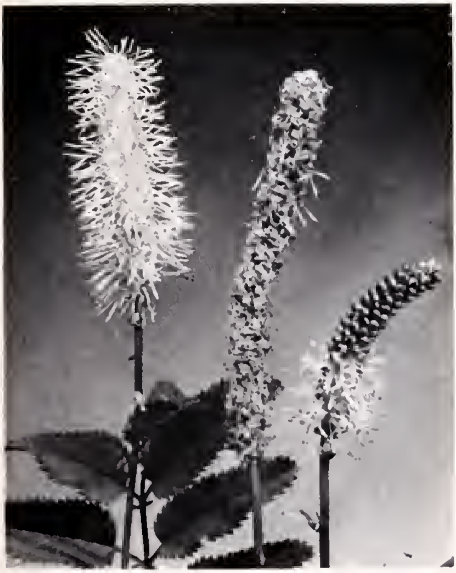
Use: The leaves may be eaten in omelettes or as fritters, and are sometimes used to flavor wines, ales and beer. Oil from the seeds is used in perfumes.

Horticultural Use: This handsome plant is decorative toward the back of a border.

Culture: Grows well in any garden soil. Grown from seed. After blooming the second year the plants are replaced.

Flower spike of clary sage.

Burnet grows in neat, rounded clumps.



Roche

Flower heads of burnet.

Burnet ***(Sanguisorba minor)***

A very pretty perennial with graceful compound leaves and oblong flower heads dotted with very small white or rosy flowers. It grows to about 1 foot high.

Use: The leaves have a cool flavor somewhat like that of cucumbers. They are used in salads and in cool drinks.

Horticultural Use: The graceful appearance and pleasant green of burnet leaves make it a useful plant near the front of a border, especially if the rather untidy flower heads are cut off.

Culture: Grows in any garden soil and is easily raised from seed. Burnet may also be propagated by division.

Harvesting: The fresh leaves are picked as wanted, are best when young,

McFarland

Edging of gray-green lavender-cotton (*Santolina chamaecyparissus*).

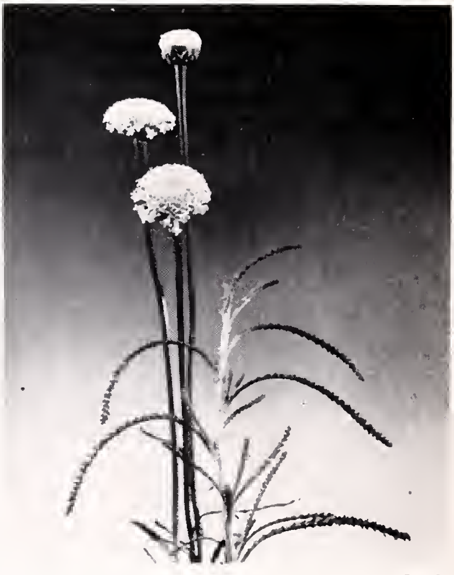
Lavender-Cotton (*Santolina chamaecyparissus*)

Tender shrubby perennial which is not reliably hardy in the vicinity of New York, surviving some winters and not others. The gray, aromatic leaves are divided into minute segments and the whole plant has a coral-like apperance. Flower heads are yellow buttons on long stems.

Use: Principally used as an ornamental. Formerly considered valuable as an antiseptic.

Horticultural Use: Striking gray color makes good accent in herb garden. There is a bright green species, *S. virens*. Both can be clipped and are valuable as border plants or small hedges.

Culture: Will grow well in poor soil and bright sun. Propagated by cuttings.



Roche

Flowers and leaves of green lavender-cotton (*S. virens*).

McFarland

Summer savory.

Summer Savory
(*Satureia hortensis*)

A tender annual growing to 18 inches or less, with small, bronzy-green leaves and minute white or lavender flowers. The leaves are pungent and spicy.

Use: Summer savory is widely used as a condiment with meats and vegetables. It is generally considered a little sweeter-flavored than winter savory.

Horticultural Use: Not outstanding as an ornamental as the small leaves are sparse and less conspicuous than the stems.

Culture: Grows best in a well-worked loam. Seeds are planted out-of-doors in spring.

Harvesting: Leafy tops are cut when plants are in bud and hung in an airy shaded place until crisp and dry.

Winter Savory
(*Satureia montana*)

This hardy perennial has dark green, shining, pointed leaves much stiffer in texture than those of summer savory. The plant is woody and grows up to 2 feet high. It has small white or lavender flowers.

Use: A very good condiment, not as sweet as summer savory. It is also used as a flavoring in some liqueurs.

Horticultural Use: Makes a good low hedge or accent plant.

Culture: Does best in a light sandy soil. Dead wood should be kept trimmed out. It is propagated by cuttings or raised from seed.

Harvesting: The young shoots and leaves may be picked at any time. The leaves are almost evergreen, but not so pungent in winter. They are best dried for winter use.

Gottscho-Schleisner

Winter savory in bloom.

Tansy plants.

Tansy ***(Tanacetum vulgare)***

A tall, hardy perennial reaching 3 or 4 feet in height, with dark green, fernlike foliage and bright yellow, buttonlike flowers in flat clusters. Tansy has become widely naturalized in the United States.

Use: Tansy is used sparingly in cooking, but is said to be quite poisonous so should be used with caution.

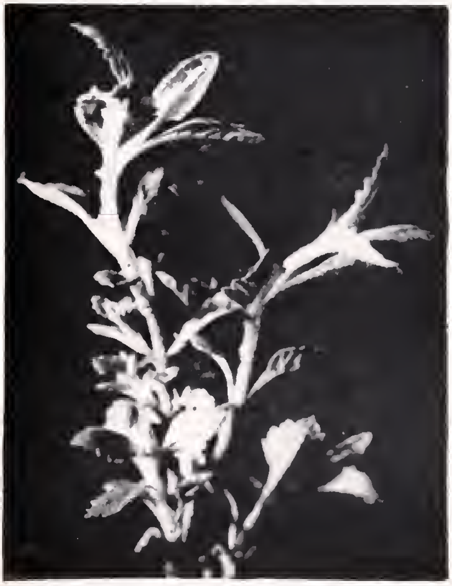
Horticultural Use: A good background plant, both foliage and flowers being attractive. Has a tendency to become weedy and sprawl.

Culture: Grows in almost any soil. Propagated by root divisions.

Roche

Bright yellow, button-like flower heads of tansy.

Germander bordering stone steps. *McFarland*



Germander leaves.

Germander
(*Teucrium chamaedrys*)

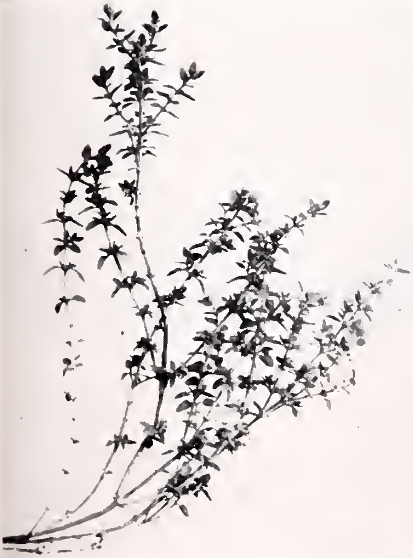
Semi-hardy woody perennial growing to about 1½ feet; may need winter protection except in mild climates. The shiny leaves are oval and scalloped, dark green and covered with fine hairs. The flowers are reddish-purple spotted with red and white, borne in loose spikes.

Use: Germander is chiefly grown for its ornamental value.

Horticultural Use: Makes an excellent border plant, can be clipped into low hedge. Often used in knot gardens.

Culture: Grows in almost any soil. Propagated by division and cuttings.

Common thyme growing among rocks. *Gantner*



Gantner

Common thyme.

Common Thyme
(Thymus vulgaris)

Low-growing, wiry-stemmed perennial reaching about 6 to 10 inches. The stems are stiff and woody, the leaves small, oval and gray-green. The lilac flowers are borne in small clusters. Leaves are highly aromatic.

Use: A widely used seasoning for food. Oil of thyme is used in medicine and perfumes. Famous as a source of honey.

Horticultural Use: Good as an edging plant or spreading among and over rocks.

Culture: Grows best in light, well-drained soil. It is well to renew the plants every few years. Propagated by cuttings, division and from seed.

Harvesting: Leafy tops and flower clusters cut and dried when first blossoms open.

Roche

Mother-of-thyme in blossom between flags in flagstone walk.

Mother-of-Thyme
(Thymus serpyllum)

Prostrate, spreading, shrubby perennial usually only a few inches in height. Small oval leaves and purple flowers. There are varieties with white, rose or crimson flowers, others with yellow- or white-variegated leaves. Lemon thyme (*T. serpyllum* var. *vulgaris,* also called *T. citriodorus*) has lemon-scented foliage.

Uses, Culture and Harvesting: Same as for common thyme.

Roche

Nasturtium flowers.

Nasturtium ***(Tropaeolum majus)***

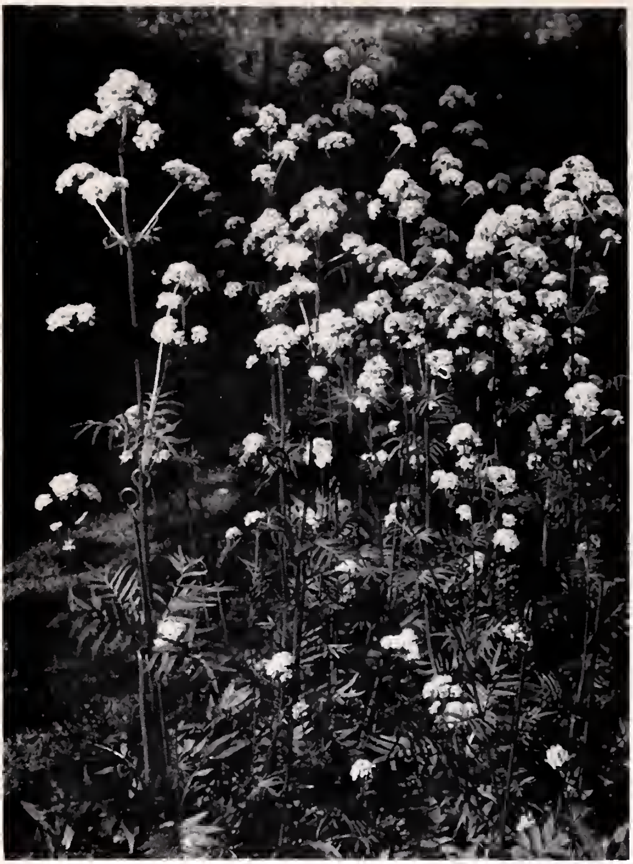
Tender annual with juicy climbing stems and round, light green leaves. One of the most popular garden annuals because of its showy flowers in many shades of red, orange and yellow.

Use: The entire plant has a spicy, peppery flavor and the stems, young leaves and even flowers are used in salads. The green seed pods can be pickled as a substitute for capers.

Horticultural Use: Useful for trailing over rocks. Dwarf nasturtium (*T. minus*) is more useful as a border plant.

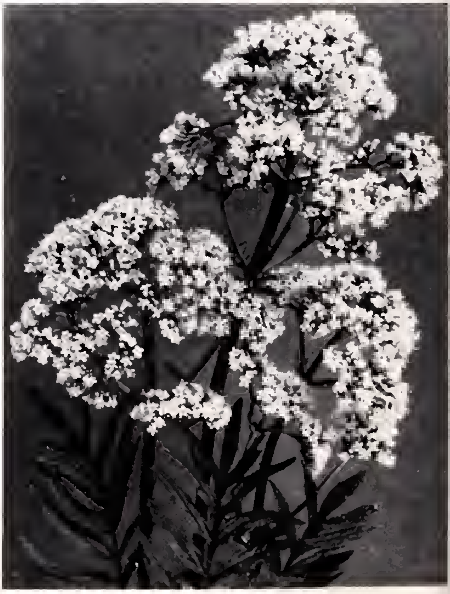
Culture: Grows in any good garden soil from seed planted after all danger from frost is over.

Harvesting: Fresh leaves and flower buds can be used at any time. The seed pods are used when full grown but still green.



Flowers of garden heliotrope are exceedingly fragrant.

McFarland



Garden Heliotrope
(Valeriana officinalis)

A hardy perennial growing to about 5 feet in height. The leaves are divided into 7 to 10 pairs of narrow leaflets. The flowers are very small, white, pinkish, red, or lavender, in larger clusters at the ends of the upright stalks. They are very fragrant. Not the same as true heliotrope.

Use: Heliotrope is grown chiefly as an ornamental and for the fragrance of its flowers, and it has some medicinal value.

Horticultural Use: Tall and stately, heliotrope is good for the back of a border or as an accent plant.

Culture: Grows well in any good garden soil. Easy to grow from seed or by division.

Sweet violet. *McFarland*

Sweet Violet ***(Viola odorata)***

Familiar hardy perennial with creeping rootstalks and heart-shaped leaves. There are over 600 kinds of violets known; this species is one of the most fragrant. Blossoms are deep violet and single.

Use: Grown chiefly for the beauty and fragrance of the blossoms. The flowers are occasionally candied and can be used in salads. The plant also is sometimes used medicinally. Perfume is obtained from the flowers, but much so-called "violet" scent comes from orris root.

Horticultural Use: Makes beautiful edging or border plantings. Also useful in partially shaded spots.

Culture: Thrives in poor soils especially in partial shade. Raised from seed or propagated by division.

Roche

One of the best ways to build up and add to a collection of herbs is to propagate one's own plants.

PROPAGATING HERBS

Helen Whitman

PROPAGATING herbs for one's own garden is an excellent way to maintain and add to a collection, and also pays an extra dividend in interest and satisfaction—a feeling of having accomplished something worthwhile.

Most of the common herbs can be propagated easily by one or more of the usual methods of plant propagation—seeds, cuttings, division, or layering. Since these are standard horticultural techniques, they will not be discussed at length here. (For details of the various methods of propagation, see the Handbook on Propagation, PLANTS & GARDENS, Summer, 1957).

Growing from Seed

A great many herbs can be grown from seed with very little trouble. Annuals are best started out-of-doors in open ground after the soil has warmed up and danger of frost is over. In the vicinity of New York City this is about the first of May. The following annual herbs described in the dictionary section of this handbook, are easy to grow from seed:

anise
basil
borage
calendula
caraway
coriander
dill
fennel
nasturtium
summer savory

Some herbs are biennials, that is, they come from seed the first year but do not bloom and set their own seed until the following year. Most of these are also easy to grow from seed. Among them are:

burnet
foxglove
feverfew
clary sage

With one or two exceptions, seeds of biennials are planted in spring like those of annuals. Angelica seeds are said to be very short-lived, so they should be sown as soon as they are ripe, in late summer. Parsley is also a biennial, but its flowers and seeds are of no particular interest to the herb gardener, so it is often treated as an annual. The seeds of parsley are very slow to germinate, taking as much as a month to six weeks, so they should be started in pots or flats in January for transplanting to the garden later. Soaking the seed in warm water for about 24 hours may hasten germination a little. Because parsley, like many other members of the carrot family, has a tap root, the seedlings are not easily transplanted except when very small. One way to get around this difficulty is to plant in small pots, two or three seeds in each. After the seedlings have started to grow, all but the strongest one in each pot are pulled out. When the plants are large enough to be planted in the garden, they can be turned out of the pots and put into the ground without injuring the roots.

Perennial herbs can also be grown quite easily from seed. They are best started indoors in flats in early spring and transplanted later to the garden. The following are frequently propagated in this way:

absinthe
bedstraw
catnip
cicely, sweet
horehound
hyssop
lovage
marjoram, pot
marjoram, sweet
marjoram, wild
pink, clove
rue
sage
savory, winter
thyme, common

Seeds of sweet cicely require exposure to cold for good germination and should be planted in fall to come up the following spring. If preferred, they may be stratified in moist sand or peat moss.

Division

Propagation by dividing the plants is practiced with a large number of perennial herbs, including the following:

balm
bedstraw
bible leaf
chives
flag, sweet
germander
heliotrope, garden
horehound
marjoram, pot
marjoram, wild
mints
orris
tansy
tarragon
thyme, creeping
thyme, lemon
violet, sweet
wormwood
woodruff
yarrow

Divisions are best made in spring so the plants have plenty of time to become reestablished before cold weather.

Cuttings

Stem cuttings 1 to 3 inches long, taken from new growth and rooted in sand or vermiculite, provide a convenient way of multiplying many herbs. Among those often propagated in this way are:

pink, clove
geraniums, scented
germander
horehound
laurel
lavender
lemon-verbena
marjoram, sweet
rosemary
sage
sage, pineapple
santolina
savory, winter
thyme, common
southernwood

Many of these can be taken at any time during the growing season, but in general spring is the best time.

Two herbs, woodruff and tarragon, are most frequently propagated by root cuttings rather than stem cuttings.

Layering

Layering is not such a common method of propagating herbs, but the thymes and no doubt several others, such as most mints, can be increased in this way.

Gottscho-Schleisner

A corner of the author's garden where grow many rare and unusual herbs as well as all the more familiar ones.

SOME UNCOMMON HERBS OF ORNAMENTAL VALUE

A few of these unusual herbs will add interest and beauty to the herb garden

Helen M. Fox

MY herb garden in Westchester County is on a narrow terrace at the foot of a slope. The herbs grow on either side of the long path that divides the terrace and climb up the slope which is particularly favorable to carnations, thymes, alliums, fennels, galiums and a few low artemisias. The effect of the planting is gray and filmy due to the foliage which is often much divided, and to the much-branched habit of growth of most of the plants. Most of the plants belong to the Mint, Composit or Parsley Families and their small, generally pastel-tinted flowers in white, violet or pale pink, with now and then yellow ones, help to increase the filmy effect Plants with large conspicuous flowers, suc as peonies, though they have herbal virtues, do not fit in well with the lacy-leaved delicately-flowered herbs. Moreover, som native weeds are true herbs, but have t be excluded because they become unman ageable in the rich soil of the garden, which is not permitted to suffer from lack of water during dry spells.

Edgings

In this type of garden the edges should be definitely marked, preferably by shrubby, compact plants, such as dwarf lavender, germander (*Teucrium chamaedrys*), santolina or shrubby silver thyme (*Thymus vulgaris* var. *argenteus*). One of these kinds can be planted stiffly in a row, or a softer effect can be achieved by having several kinds intermingled. Other plants for these edgings are *Artemisia stelleriana,* chives, or *Salvia officinalis* var. *purpurascens,* a form with wine-red leaves.

Native American Herbs

There are many handsome onions (*Allium* spp.) for the herb garden. One of them, *Allium cernuum,* was gathered for food by Indians and explorers such as Lewis and Clark. The flowers look pink but are actually white-tinted violet-pink, and are characterized by stems that bend downward when the plant is young. The scapes (as the stems are called) are 2 feet high or less, and the leaves are shorter.

I first saw prickle-poppy (*Argemone*) growing freely in Colorado, Iowa and down into Mexico. There are two closely related species of *Argemone, A. platyceras* and *A. mexicana,* which is the true herb. They both have glaucous spiny leaves, stems about 2 feet high, and flowers 2 inches across, either pure white or ash rose. Both plants yield a yellow juice. That of *A. mexicana,* among other virtues, is supposed to cure warts. The seed is said to be purgative and narcotic, when smoked with tobacco. The plants seed themselves from year to year.

In September when walking through moist woods, one may encounter a pleasant fragrance of balsam coming from yellow flowers borne on wide-spread branches of *Collinsonia canadense,* popularly called citronella because of its lemon-like scent. It is also called horse balm or balm. Unfortunately, the deer like it so much that in my garden they have eaten every bit of it.

One attractive plant seems to have had special difficulties with the botanists. In the seed catalogues it is called *Brittonastrum canum,* but in the latest technical books it is *Agastache cana.* In my garden it grows about 2 feet high, has straight stems carrying terminal spires of pale or deep rose flowers, shaped something like those of beebalm. The penetrating and delicious scent given forth from the leaves and flowers has elements of mint, lavender and resin. The flowers open late and continue into November. Unfortunately the plant, which is native to the Southwest, is not always hardy in my garden, so I carry it over the winter in a cold frame.

Fireweed (*Epilobium angustifolium*) is widespread, for it is native to Europe, Asia, and North America. It has handsome spires of rosy-violet flowers atop stems generally about 3 but sometimes as much as 8 feet high. Its relative, hairy willow herb (*Epilobium hirsutum*), has a soft velvety texture, and smaller, pinker, and practically stalkless flowers. The willow herb grows to 4 feet high and flowers from July into September. In Russia, a tea called Kaporte, is made of the leaves of both plants.

By June first, a member of the Rose Family, Indian physic (*Gillenia trifoliata*), also called bowman's root, opens its inch-wide white blooms on reddish stems. The plant grows to 4 feet high, and it roots were used medicinally by the Iroquois Indians.

A handsome plant from the Northwest, *Penstemon confertus* has yellow flowers on stems 2 feet high.

A lovely member of the Mallow Family and a common weed where I live is hollyhock mallow (*Malva alcea*). It grows about 2 feet high and has white or pink flowers more than an inch across. In the white form the pistil is pink. Unfortunately, it spreads freely from seed, but it can be controlled by digging up unwanted young plants.

Attractive in the border, though it has slightly coarse foliage, is *Lobelia siphilitica,* with deep blue flowers in late summer.

Mountain mints (*Pycnanthemum virgin-*

Many species of onion have surprisingly attractive flowers. This one is *Allium tuberosum.*

Gottscho-Schleisner

ianum and *P. flexuosum*) look a little like pot marjorams, only their flowers are white and the whole plant smells of pennyroyal and peppermint. They grow wild where I live. Also a native, *Pycnanthemum muticum* is much prettier because of its gray-green foliage and less shrubby habit of growth. Its tiny white flowers are dotted purple inside and grow in wide large flat-topped heads.

Herbs from Foreign Lands

Among the annual herbs pretty for the herb border is *Nigella sativa.* It is very like its popular relative, love-in-a-mist (*Nigella damascena*), only instead of being sky-blue, its flowers have a green look and are actually white marked with blue, and embellished with touches of gold. It grows about 15 inches high and has hairy leaves divided into thin segments.

Mignonette (*Reseda odorata*) is known for its exceedingly fragrant, yellow-white flowers borne on more or less floppy stems.

A thistle-like annual, St. Mary's or holy milk thistle (*Silybum marianum*) has spiny-toothed leaves with pale green veins and spots on their upper surfaces. The rosy-violet thistle-like flowers are solitary atop 2- to 3-foot stems. It was used medicinally in olden days.

Either an annual or biennial is *Thymbra spicata.* The seeds came from Israel, where it is native. It is neat-looking, hairy and leafy, about 9 inches high, and resembles woolly thyme and *Satureia montana.* The main stem is woody and brown, while the side branches are pale green. All branches carry whorls of narrow leaves and from within these whorls on either side of the stems come purple stalkless flowers tinged with rose. In their native land, undoubtedly, they smell sweeter than they did in my garden where they had a thymey odor. *Thymbra spicata* has been described by a visitor to Cyprus as "cushions of rosy-pink flowers with a pleasant scent and most attractive."

In California and along the Mediterranean, rues make wide, lush plants 2 feet or more high and across. Here in the East they are much skimpier. The mustard-yellow flowers of *Ruta chapalensis* have fringed petals and the leaves are more slender than those of *R. graveolens*. Both share the same bad smell. *Ruta montana* has very finely divided gray-green leaves and small yellow flowers. This rue and *Ruta bracteata* both yield Algerian oil of rue. Since early days, dwellers along the Mediterranean have used rues for medicine and oddly enough for condiment.

Along many parts of Mediterranean shores, euphorbias are almost as common as dandelions are here. Sometimes, as at Delphi, they make bushes 3 or more feet high and grow in formidable clumps. Dr. L. H. Bailey said there are a thousand species and the United States Dispensatory lists twelve as medicinal. A hardy attractive one for the garden is *Euphorbia epithymoides* (formerly called *E. polychroma*). It grows about a foot high, has oblong leaves of characteristic blue-green color, and umbels of yellow flowers which appear here in May. They are effective with the bright green of early spring.

A beautiful Mediterranean plant is *Salvia triloba*. Stems and leaves are very gray and the flowers come in panicles of pale rose-pink. The plant, alas, is not hardy, but so handsome it is worth carrying over indoors along with rosemary. It, too, grows as much as 3 feet high and wide.

Every autumn some visitor to my garden exclaims in surprise upon seeing *Colchicum autumnale*, not knowing that they are herbs. They are, and their globe-shaped violet flowers, like huge crocuses, bring color and interest to the September garden. The thick, strap-like leaves come in early spring, and when they turn bronze, unfortunately bring a look of fading to the lush spring garden. But they are so handsome in September it is worth enduring a few weeks' embarrassment earlier in the season.

McFarland

The flowers of colchicum resemble large crocuses. The bulbs are the source of the drug colchicine.

Many mints grow well in partial shade. *Gottscho-Schleisner*

HERBS FOR A SHADED GARDEN

How one gardener has succeeded in growing herbs without full sun

Frances R. Williams

MOST herbs are sun-loving plants and most herb gardens are planted where they get full sun the better part of the day. Nevertheless, it is possible to have at least something of an herb garden in shaded places. A few herbs, such as sweet woodruff, prefer shade, and several of those usually grown in the sun can be grown in moderate shade. It is true that often the plants will be rather spindling and will not bloom as well as they do in full sun. The oils in the leaves will not be as strong and pungent—herbs grown commercially for their oils must have full sun—but the fresh-cut leaves from plants grown in a garden in partial shade will provide plenty of good flavor for the table. My garden in Winchester, Massachusetts, is shaded by high trees and by shrubs, and is in a damp location. The beds for the plants are not very deep as there are a great many tree roots near the surface. The soil has been heavily enriched with fertilizers and compost, and large amounts of fine charcoal have been added.

In planting, I use low-growing plants between the others, and leave sufficient space between the taller plants for good air circulation. The soil of a garden in the shade is colder than that of a sunny garden, and growth starts later in spring.

One of my herb beds was near the kitchen door and was partly shaded by a trellis and by the house during the afternoon. In

Author courtesy

Sweet woodruff.

this bed I successfully grew herbs in sufficient variety to provide seasoning for salads and other dishes. Among the herbs tried here were several perennials. Lovage, with its strong celery taste, did well. Sweet cicely and marjoram did not grow vigorously, but their leaves were pungent. Burnet made a mat of cucumber-flavored leaves. Curly spearmint and lemon balm grew somewhat lower than they usually do; chives grew well, but they too were smaller than they are in the sun. Lemon thyme was delightfully pungent, and is the only one of the thymes that would live under the damp conditions in this garden. Bible leaf did not flower, but its leaves provided a flavor somewhat like that of thyme. Tarragon died, probably because it was too damp for it, without enough sunlight and air. Under drier conditions tarragon will tolerate some degree of shade.

Annuals, too, were tried in this garden with some success. Basil was of good flavor, but its growth was weak. Peppergrass (*Lepidium* spp.) was excellent. Several small plantings of this should be made over a period of several weeks, as its growing time is short. Italian parsley was satisfactory but not vigorous, and roquette (*Eruca sativa*) produced a few leaves for salads. Chervil grew here but does much better in thick compost under an arbor-vitae hedge where the bright green leaves of young growth are especially attractive. It seeds itself thickly there from year to year.

Saffron crocus does comparatively well in the shade. Its blossoms come late in the fall when they are most welcome, and the leaves remain green over winter. Sweet woodruff with its neat whorls of leaves and sheets of white blossoms in May, makes a fine cover. In my garden it contrasts pleasantly with a periwinkle (*Vinca minor*) variety that has gold coloring in the leaves.

If we use the broad definition that includes as herbs any plants used for medicine, flavor or fragrance, and if we include some that were formerly highly regarded but are now little used, we can greatly expand our list of herbs that will grow in the shade. It will take in ground covers as well as taller plants, and both native and cultivated species. Many of them brighten the dull shadows with attractive flowers. Among the herbs of this sort which have grown successfully in my garden are common comfrey (*Symphytum officinale*), bugle (*Ajuga* spp.), giant anise hyssop

Bloodroot blooms in early spring.

Roche

(*Agastache foeniculum*), asphodel (*Asphodeline lutea*), common lungwort (*Pulmonaria officinalis*), and lily-of-the-valley (*Convallaria majalis*). Among the shade-loving natives that were once valued as herbs (and which are still used to some extent) are wild ginger (*Asarum canadense*) whose root-stalks can be preserved or candied like ginger, blood-root (*Sanguinaria canadensis*), spring beauty (*Claytonia virginica*), celandine (*Chelidonium majus*), Dutchman's breeches (*Dicentra cucullaria*), and violets of many kinds. Coltsfoot (*Tussilago farfara*), which was once used as a cough remedy, grows very well in the shade in my garden although it ordinarily grows in open sun. In the middle of April its bright golden-yellow flowers, like small dandelions, open before any leaves are in evidence. Later the rich green, white-lined leaves provide a cover for the area. Coltsfoot does spread rapidly and therefore must be kept in bounds. In my loose leafy soil I have no trouble pulling it out.

The plantain-lilies (*Hosta* spp.) are not usually considered herbs but correspondence with friends in Japan reveals that there the leafstalks and blades of several kinds are used as food. They are used in soups, salads and pickled in various ways. Therefore it is perhaps permissible to mention them in an article on herbs—especially for the shaded garden, since they grow very well in shade. There are many beautiful species and varieties that provide a range of foliage color and texture. Many have very attractive small lavender or white lily-like flowers.

These are some of the herbs that I have grown successfully in a shady garden; I am trying several more in various corners and I know there are still others that could be grown under similar conditions. They are well worth trying if no sunny spot is available.

Handsome foliage of *Hosta glauca*. *Author courtesy*

LIVING SPICE BOX

Elsa Huntley

"WHO would therefore looke dangerously up at Planets that might safely looke downe at Plants?" asked John Gerard in his *Herball* in 1597. If you agree, why not look now to a small garden of useful, pleasant herbs immediately at hand in a sunny kitchen window? Containers for such a garden may be large or small, plain or fancy. Planting boxes of California redwood are both attractive and practical. One or two of them are enough for a little culinary garden containing herbs for flavor and spice, color and fragrance.

Herbs with few exceptions, one of these being parsley, require good drainage and full sun, so select a window with a southern exposure if at all possible. If the plants are in individual pots or boxes, they may be removed from the window in which they grow and used for ornamental purposes in other positions from time to time, but their need for sun must be remembered, and they should soon be returned to the window.

Many herbs grow too tall for the window garden, or their roots are too large and heavy to be confined in a small pot. Therefore it is wise to choose plants with discretion and with an eye to design. For a handsome and flavorful "spice box" the following herbs are good. At either end mints could be planted. Orange mint and the variegated pineapple mint are both good. There are dwarf basils, probably merely smaller forms of the ordinary sweet basil. One of these has attractive purple foliage. Chives and parsley are of course indispensable for the window herb garden. Thyme is so useful in cooking that it must be included also. The yellow-gold flowers of pot marigold brighten the indoor garden and the petals can be used to give a rich color to custards and pudding sauces. Nasturtiums also provide a splash of color for the window-ledge herb garden, and the leaves and flowers are delicious in salads.

For flavoring meat dishes, the marjorams are useful, and both sweet marjoram and pot marjoram do well in indoor gardens.

A spot should be found if possible for a pot or two of scented geraniums. Rose geranium is one of the best-loved, but there are other beautiful fragrant kinds (see page 156). Even though one does not care to use a leaf or two to flavor cakes or jellies, the plants are beautiful, and some of them have attractive flowers.

Last, but never least, there should be rosemary. This is one of the most beloved of all herbs and has been held in highest esteem through the ages. It is useful in many ways. Add ½ teaspoonful to biscuit mixtures, or rub some on the breast of a roasting chicken. It is very good with mushrooms too, or with veal casserole. And always remember, when eaten it "comforts the heart and makes merry the spirit."

Culture

A good soil mixture for potted herbs consists of three parts loam to one part compost or well-rotted manure. The soil should be light and well-drained. Be generous with the pot size and water regularly. If necessary, spray every three or four weeks with a nicotine insecticide which contains a soap spreader to control aphids. Wash the plant thoroughly with the solution and let it stand a few hours, then spray thoroughly with clear water to remove spray residue.

Use herbs with imagination in your window garden and you may have as much fun as in a conventional herb garden with walks, knots and allees, and certainly you will have fewer backaches.

HERBS IN NEW ENGLAND

Helen Tilton Batchelder

THOUGH the growing season is short and the harvest small, New England soil is especially well adapted to growing herbs of the finest flavor and fragrance.

All the usual culinary herbs can be grown—sweet marjoram and parsley as annuals; rosemary, pineapple sage and lemon-verbena under glass in winter.

In the last few years flower shows and garden clubs have made New Englanders aware of the decorative value of herbs, especially the grays of sage, santolina, lavender, artemisia and lamb's ear. More attention is now being paid to long-period foliage effect, such as that of wild ginger, lungwort, angelica and thistle. In southern New England where snowfall is light, winter garden color becomes important. Garnet of thymes and winter savory, maroon of houseleeks and Madonna lilies, sharp green of wall-pepper and burnet blend with the intensified violets, grays and black-greens of other herbs. Three to six inches of snow turns a patterned herb garden into a valentine.

Considering the well-known variability of New England's climate, plus the fact that parts of Connecticut, Rhode Island and Massachusetts are in a warmer climate zone than the rest of New England, it is rather difficult to make any hard and fast statement of which herbs are winter-hardy. Off-hand, one would say the milder region had all the advantages, yet plants which here alternately freeze and thaw in January, then burn in the drying winds and hot sun of March sometimes do much better further north under a heavy blanket of snow.

Certainly the previous summer's care has a definite bearing on winter survival. Although herbs flourish in poorer ground than most perennials, a soil containing limestone, adequate plant food and thorough watering in time of drought produce healthy plants better able to withstand climate shock.

Prospective herb-growers should study the contours of their land; air drainage is important and one should make use of warm, sheltered spots and avoid low-lying "frosty" areas.

Woody herbs such as santolina and lavender should never be severely pruned later than mid-July lest they be stimulated into growth which would not have time to harden before September frosts.

Herbs have never been very subject to the "improvements" of commercial hybridizers, but some of them, e.g., the lavenders, are highly variable and cross naturally among themselves, giving rise to strains within varieties, so that apparently similar plants may differ widely in hardiness as well as other characters. In New England, if one has had difficulty with a favorite herb, it is definitely worth trying specimens from nurseries in different parts of the country to find the best examples of both fragrance and hardiness. Plants grown from seed or cuttings sometimes fare better than nursery stock from widely different soil and climate conditions.

Mulches are as important to herbs as to any other plants and are invaluable in minimizing the harmful effects of freezing, thawing and drought. Any light porous material will do, but perhaps in a patterned garden where neatness is a factor, 2 inches of buckwheat hulls are most attractive.

In winter, marsh hay, cranberry tops and evergreen boughs break the force of drying winds, and even the shadow of a nearby bush may make the difference between success and failure.

All things considered, though, the cold-frame is undoubtedly a New England herb-grower's best friend. It is always prudent to take August cuttings and, wel before the swamp maples turn color, to tuck away small plants of lemon balm tarragon, pineapple mint, thymes and other temperamentals.

The author's herb garden in Massachusetts is planted in attractive pattern.

Pattern of herb garden shows up especially well and is greatly appreciated in winter.

Photographs author courtesy

THE REFRESHING MINTS

George Kalmbacher

AMONG the many families of plants in the world, the Mint Family (Labiatae) is outstanding for the intriguing fragrance of its foliage. The Mint Family is a large one and is divided into 160 groups called genera (one division is a genus). Of these divisions the genus *Mentha* is queen. Not all plants in the Mint Family are mints, only those belonging to the genus *Mentha*. Many herbs, for example thymes, sages and marjorams, are in this family. The importance of the true mints in everyday life can be realized by picturing a world without peppermint candy, spearmint candy, mint sauce and jelly, crème de menthe and mint juleps!

The value of the useful mints lies in volatile oils produced on their leaves and stems. These oils are found in tiny glands which can be seen with a magnifying glass. If a hand is brushed against the plant some of the oil is released and clings to the skin.

McFarland

Apple mint.

Kinds of Mints

Mints have been grown for centuries, and as so often happens when economically important plants have been grown for long times, hybridization has occurred. It may come as a surprise to many to learn that peppermint (*Mentha piperita*) is a hybrid—a cross between spearmint (*M. spicata*) and water mint (*M. aquatica*). Even spearmint itself is thought to be the result of a cross between apple mint (*M. rotundifolia*) and long-leaved mint (*M. longifolia*). There are many other hybrid mints and even the true species are highly variable, so the naming of the many kinds of mints has become involved and uncertain.

Common Mints

Despite the confusion in naming many of the mints, some of the most commonly grown ones are reasonably definite and can be recognized. Among these are four which produce their flowers in slender spikes. These are peppermint, spearmint, apple mint and long-leaved mint. Peppermint can be distinguished from the other three because its leaves are on small stalks; the leaves of the others have very short stalks or none at all. Of these, spearmint can be recognized by its almost hairless leaves. Apple mint and long-leaved mint have hairy leaves, but those f apple mint are quite rounded, the leaves of the other longer and more narrow.

When "mint" is spoken of, usually spearmint is the one being referred to. It is the one most often used in making mint jelly, sauce, juleps and so on. Apple mint and long-leaved mint are probably just as useful, but their woolliness has kept them from becoming so popular. Another mint, *Mentha niliaca*, has leaves that are so velvety that English children call them "fairy blankets." This is a tall mint, growing to 3 or 4 feet in height, and it is thought to be a hybrid between apple mint and either spearmint or long-leaved mint.

Water mint (*M. aquatica*) bears its flowers in little rounded balls at the tips of the stems and in the axils of the uppermost leaves. The leaves are egg-shaped, have stalks, and are somewhat hairy. One well known variety of water mint has crisped or crinkled leaves and is sometimes called *M. crispa*. There are also forms of other mints that have crisped leaves. Bergamot or lemon mint is very likely also a form of water mint with smooth, hairless leaves.

McFarland
Bergamot mint.

McFarland
A curly-leaved mint.

Pennyroyal (*M. pulegium*) is quite different in appearance from the other mints. It is a much-branched, prostrate perennial with its flower heads in the axils of rather long leafy stalks. Its delightful fragrance was believed to drive away fleas, hence its scientific name which is derived from "pulex," the Latin for flea.

Of all the mints, Corsican mint (*M. requieni*) is one of the most charming. It has minute leaves, not much bigger than those of the familiar baby's tears (*Helxine*). It grows in a mat close to the ground and has a very strong, delicious odor.

SCENTED GERANIUMS

Dorcas Brigham

WHEREVER herbs are mentioned or grown one is sure to find included some of the scented geraniums since they are unsurpassed for fragrance, color and form. One can choose, from an extremely large list, kinds which are dark or light green, wide spreading or compact, erect or sprawling, dainty or bold, to fit the demands of the situation. There are a number of them whose flowers add gaiety and color to the garden.

Scented geraniums are very satisfactory also because of the ease with which they can be grown and their clean bill of health —they are seldom attacked by insects or plant diseases if given sufficient room to grow, free air circulation about them, and fertilizer.

Propagation

The ordinary method of propagation of scented geraniums is by cuttings taken in early fall before frost. With a sharp knife a clean cut is made just below a node (point where a leaf grows from the stem). Cuttings of the larger-growing varieties are taken about 4 to 5 inches long, those from smaller kinds about 3 inches. The cut ends may be dipped in Rootone or other root-stimulating hormone and are then inserted in clean sharp sand. A gardener's flat is a convenient container for rooting the cuttings. A layer of partly rotted leaves is placed in the bottom and the flat is filled with clean sand over which fermate may be dusted as a precaution against rotting. The cuttings are inserted deeply enough to be held erect when the sand is firmed about them. Sufficient room should be left between the rows to allow free circulation of air. The cuttings are watered and kept shaded for a few days. After this the shade should be removed and the cuttings exposed gradually to sunlight. They should be kept on the dry side and not overwatered.

When the roots are ½ to ¾ of an inch long (roughly two weeks, under average conditions) the rooted cuttings are potted in 2- or 2½-inch pots in light soil. When the roots have filled these pots the plants are moved again, the more vigorous kinds into 4-inch pots, the smaller-growing ones into 3-inch pots. A good potting mixture consists of 3 parts loamy soil and 1 part leaf mold. If the soil is on the clayey side, add some sand to the mixture. To each bushel of the mixture, a 4-inch potful of bone meal is added.

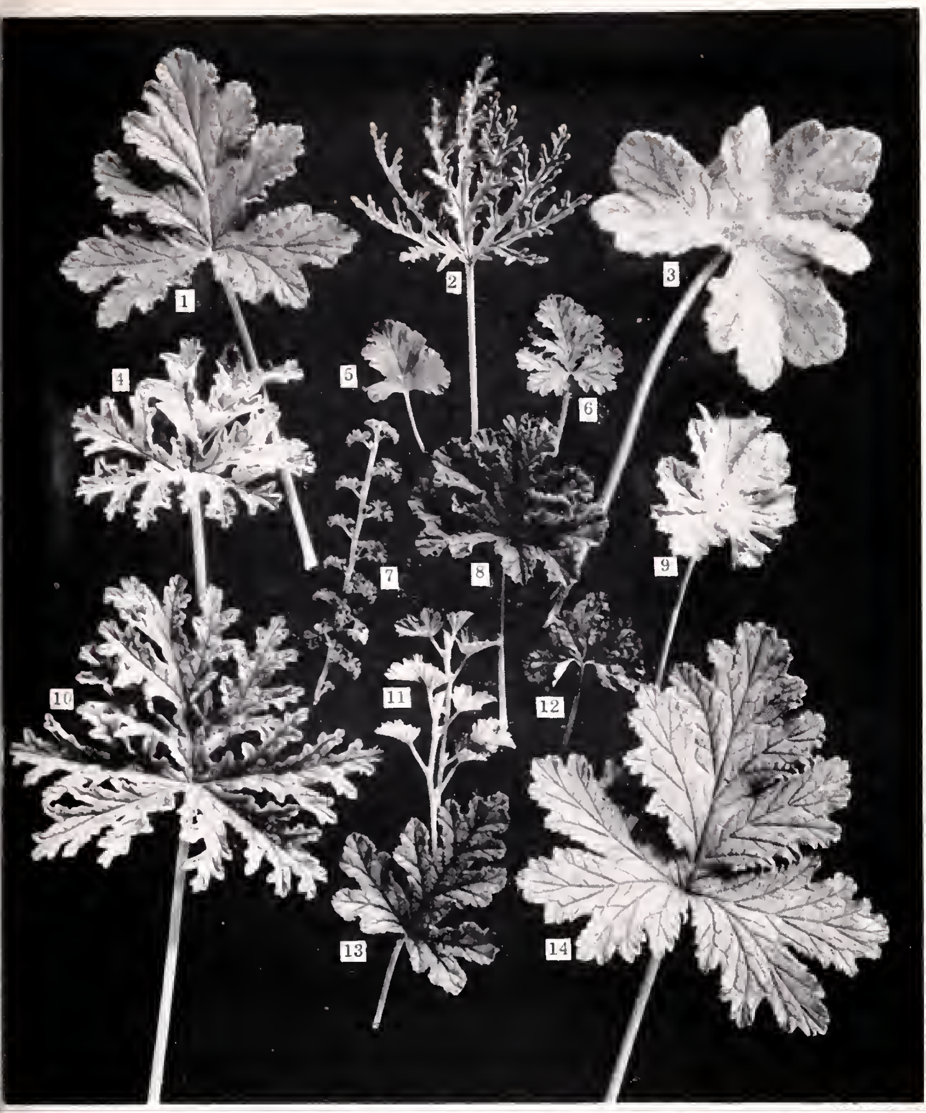
To grow the finest specimen plants they should be given sunlight and sufficient space that they will not crowd one another. Bushier plants can be produced by pinching back the tops. After danger of frost is past the geraniums can be set out in the garden. The smaller varieties, such as apple, nutmeg, lime and ginger should have 20 inches between plants; for sprawlers such as 'Joy Lucille', peppermint (*Pelargonium tomentosum*), 'Godfrey's Pride' and lemon balm (*P. melissinum*), 40 inches is not too much. In climates like those of California or Florida, where these geraniums can be grown out-of-doors through several seasons, even more space should be allowed.

Rose geranium (*P. graveolens*), peppermint (*P. tomentosum*) and the variety 'Clorinda' are described in the dictionary section of this handbook, so will not be discussed further here. In addition to these three indispensable favorites at least some from the following list deserve a place in every herb garden.

Compact Growers—Especially Good for Edgings

'Prince of Orange' (*P. citriodorum*). Neat habit, small leaves of delicious orange-lemon fragrance with a hint of cedar. Flowers showy, light lavender with maroon blotches on upper petals.

Lime-scented (*P. nervosum*). Small, roundish leaves with sharply toothed



McFarland

Kinds of scented geranium leaves: 1. *Pelargonium graveolens*, 2. *P. denticulatum*, 3. *P. tomentosum*, 4. Variety '*Lady Plymouth*', 5. *P. fragrans*, 6. Variety '*Little Gem*', 7. *P. crispum*, 8. Variety '*Rollinson's Unique*', 9. Variety '*Torento*', 10. *P. graveolens* × *radens*, 11. *P. citriodorum*, 12. *P. capitatum*, 13. *P. quercifolium*, 14. *P. graveolens* var.

margins and a clean lime fragrance. Flowers lavender with dark markings.

Ginger-scented (*P. torento*). Similar to lime-scented but with larger, lighter leaves and a ginger-like fragrance.

Apple (*P. odoratissimum*). Small-leaved rosette about 6 inches high, eventually spreading to about 1 foot across. Leaves gray and soft with apple-cider scent. Tiny white flowers. Comes easily from seed and best grown this way.

Cocoanut (*P. parviflorum*). Similar to apple geranium in habit, but with dark green, pungent leaves and minute, dark

Roche

Lemon geranium.

rose-red flowers. Also grown easily from seed.

Nutmeg (*P. fragrans*). Small, smooth, gray-green leaves and picturesquely spreading branches. Sprays of small white flowers, pungent scent. The hybrid variety 'Logeei' (*P. fragrans* × *P. odoratissimum*) is more compact, has a more apple-like scent.

Little-leaf Rose (*P. graveolens minor*). Leaves like rose geranium, but smaller; plant compact. Strong rose scent.

'Little Gem' (*P. terebinthinaceum*). Compact, low-growing; leaves lobed and pungent. Lavender-pink flowers.

'Schottesham Pet'. Similar to 'Little Gem' but leaves are more pubescent and have the odor of filberts. Rose-red flowers.

Taller Kinds

Other scented geraniums which are taller, but still compact in habit are *Pelargonium crispum* which has very small, waved leaves, and the fingerbowl geranium (*P. crispum minor*) with still smaller, sessile leaves. A variety, 'Prince Rupert', is a larger counterpart of these; while still another variety sometimes called 'French Lace' is variegated with white. All four of these geraniums have a delightful lemon fragrance and present a formal, clipped appearance. Closely allied to them are the gooseberry-leaved geranium (*P. grossularioides*) which has tiny crimped leaves with golden markings, and strawberry-scented (*P. scarboroviae*) with slightly larger leaves and bright rose-colored flowers. This one is rather difficult to root and grow.

For Bold, Heavy Effect

Certain of the scented geraniums are vigorous and spreading in habit, and make good background plantings or fillers where masses of foliage are needed.

'Godfrey's Pride'. Large, 5-lobed leaves with a large patch of gold in the center and a delightful mint scent. Somewhat prostrate in habit.

'Joy Lucille' (*P. tomentosum* × *P. graveolens*). Light green, lobed, tomentose leaves with a strong mint scent. Rampant grower.

Lemon balm (*P. melissinum*). Beautiful, dark green, three-lobed leaves; scent like that of lemon balm.

Gottscho-Schleisner

Skeleton-leaf geranium.

'Round-leaf Rose'. Light green, shallowly lobed leaves with a rose scent. This may be a variety of *P. graveolens*. There is a variegated form sometimes called 'Snowflake'.

For Fern-like Foliage

Pelargonium denticulatum and its fern-leaved form have much cut, light green, fern-like foliage that offers a fine contrast to the heavier varieties. They have a strong oily scent. A cross with the peppermint geranium has produced a delightful plant with gray-green, felt-like leaves called 'Pungent Peppermint'. It has a good mint scent, and is a favorite with gardeners. 'Dr. Livingstone', also called 'Skeleton Rose', and the gray-leaved 'Crowfoot' (*P. radula*) are known to many growers of scented geraniums. Their leaves are more coarsely divided than those of the fern-leaved kinds but make handsome mounds of foliage.

For Showy Flowers

The previously mentioned variety 'Clorinda' has perhaps the most beautiful blossoms of any scented geraniums, but there are some others that should not be overlooked.

'Apricot' (*P. scabrum*). Rich carmine-rose flowers against glossy, dark green foliage.

'Mrs. Kingsbury' (*P. rapaceum*). Rich cerise flowers and curled, parsley-like leaves having a minty scent.

'Mrs. Taylor' (*P. ignescens*). Bright red flowers which do not combine well with the rosy tints of most of the others.

'Old Scarlet Unique'. Large scarlet flowers with contrasting black marks on the petals.

'Shrubland Rose'. Rose blossoms against handsome dark, glossy leaves.

'Rollinson's Unique'. Stunning rich magenta flower heads on long stems against a background of dark, ruffled, pepper-scented leaves.

Oak-leaved Geraniums

No discussion of scented geraniums would be complete without mention of the oak-leaved group, all of which have a peculiar oily-sweet scent which many people do not enjoy. Of this group two of the best are the sharp-toothed oak (*P. quercifolium pinnatifidum*) and 'Village Hill Hybrid'. Sharp-toothed oak has lovely dark purple markings in its handsome glossy leaves and very showy deep rose flowers. The young leaves of 'Village Hill Hybrid' unfold like curled parsley, making a pretty pattern against the lobed mature leaves. Showy lavender flowers with purple markings make this vigorous grower an attractive addition to the garden.

Gottscho-Schleisner

Oak-leaf geranium.

An Unusual Geranium

In conclusion I should like to mention a plant one would scarcely recognize as a geranium at all, the southernwood-leaved geranium. Only the carmine-blotched, white flowers give it away. The grayish leaves are finely divided and look like southernwood or old man, and even resemble this in their scent. A plant of this geranium will be a conversation piece in any collection.

Roche

Brick path bordered with fragrant beds of thyme.

THE VERSATILE THYMES

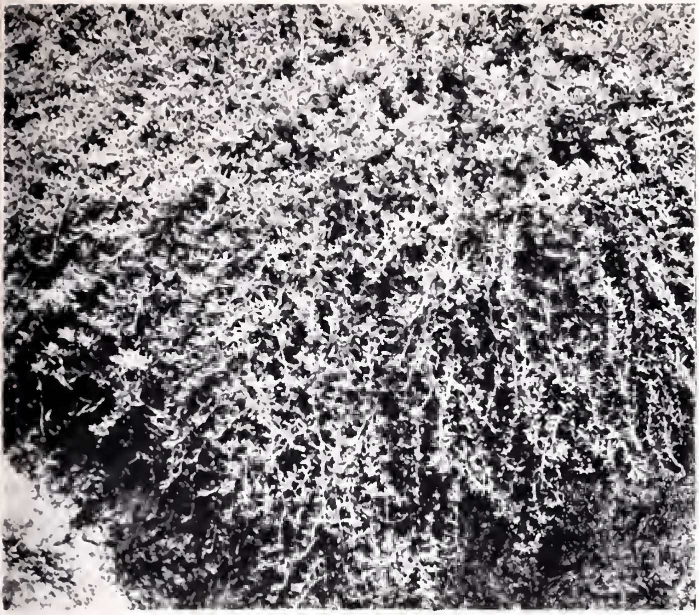
Helen S. Stephens

THYME is probably best known for the use made of the dried leaves as a seasoning and rightly so, as it adds a delicate, individual flavor to many cooked meat dishes, is used in a "bouquet garni" and in "fines herbes", and makes a delightful vinegar when used with a good red wine vinegar. Most of us have used thyme in our cooking, possibly first by shaking a greenish-brown powder out of a box. But we may not know the pleasure to be derived from growing thyme in our gardens, where it is charming and has many varied uses.

There are a number of thymes. The scientific name given to them, *Thymus*, is derived from the Greek word meaning "to fumigate." Thymes belong to the Mint Family (Labiatae) and like many others in this family are rich in volatile oils which are extracted for medicinal and flavoring purposes.

The natural habitat of the thymes is the Mediterranean region. In warm climates there is no worry about winter care, but where freezing occurs in winter they should be protected with a mulch, such as salt hay or straw, and they should be pressed down into the earth if they begin to heave. Like most other herbs, they need good drainage and do best in plenty of sun. Thymes can be propagated by layering, by dividing or by growing from seed.

The two most frequently grown species of thyme are common thyme (*Thymus vulgaris*) and mother-of-thyme or creeping thyme (*T. serpyllum*). Roughly, common thyme and its varieties are somewhat upright; creeping thyme and its varieties,



Woollystem thyme creeping over rock wall.

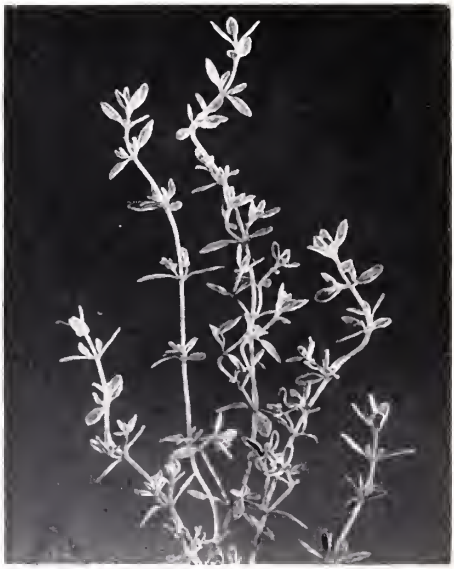
Singer

of which there are many, are prostrate. One of the chief charms of the different kinds of creeping thymes is the variety of leaves which they exhibit. They may be light or dark green, or gray, gold or silver; some are rounded, others pointed; and they may be smooth and shiny or hairy.

Some of the thymes are desirable as accent plants near the front of a perennial border. Particularly good for this use are the beautiful gold- and silver-leaved varieties of creeping thyme (*T. serpyllum aureus* and *T. serpyllum argenteus*) which grow about 6 inches high and are delightfully lemon-scented.

In the rock garden thymes can be used as accent plants or for carpeting. A fine plant of Scandinavian thyme (*T. glaber*) with its dark green, glossy leaves cascading over a rock is a lovely sight. Equally captivating is woollystem thyme (*T. lanicaulis*) which has pointed, gray leaves almost like those of alyssum. These and other varieties also make fine ground covers on banks, and when their dainty pink or lavender flowers are in bloom make a beautiful picture.

Any of the creeping varieties, for example, white thyme (*T. serpyllum albus*) or rose thyme (*T. serpyllum roseus*), can be used between stepping stones or beside garden steps. The charming and very fragrant nutmeg thyme (*T. serpyllum* var.) is also excellent used in this way.



Roche

Silver-leaved thyme.

Baker

Thymus nummularius, a variety of *T. serpyllum.*

In a class by itself is woolly thyme (*T. serpyllum lanuginosus*). It has tiny, furry, gray leaves and will fall gracefully over a wall, or a large mound of it will make a garden seat to sit upon.

Two varieties of common thyme, English thyme and narrow-leaved French thyme, are the ones most used for flavoring, but the dainty little herba-barona or caraway thyme (*T. herba-barona*) is very desirable too. It combines a delightful, elusive caraway flavor with that of thyme.

In addition to those mentioned, the fo lowing thymes are useful, and not too di ficult to obtain:

British thyme (*T. britannicus*)—nea soft green foliage, large lavender flowe

Thymus comptus — tiny creeper, fa growing, red-stemmed, good planted ov rocks

T. glabrescens loveyanus — grayis hairy leaves, upright growing

T. vulgaris fragrantissimus — stro grower, grayish color.

Thymus balticus, a woolly-leaved thyme.

Bak

A GALLERY OF HERB GARDENS

—suggestions for using herbs in various ways and settings

Lees

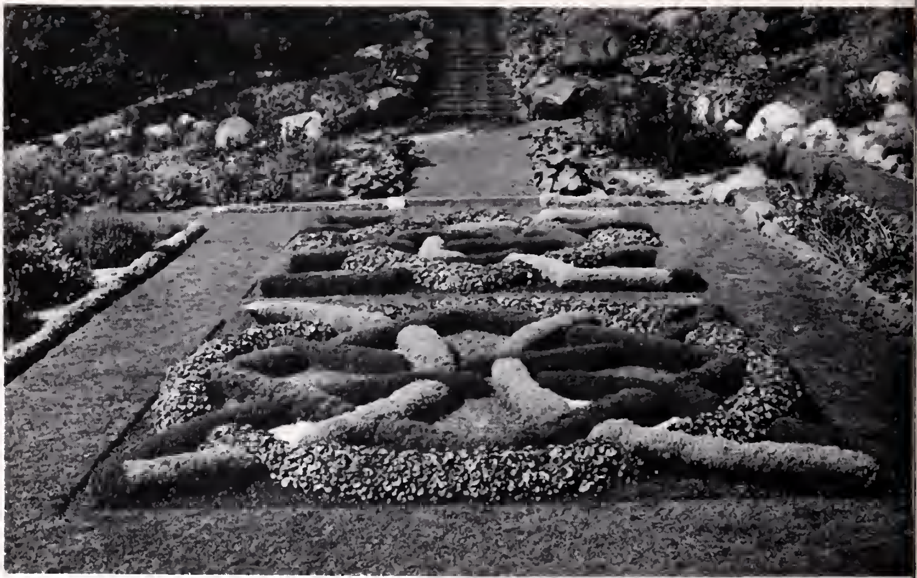
Some of the earliest herb gardens were those of medieval monasteries. This is a modern reconstruction of such a garden at the Cloisters in New York.

Gottscho-Schleisner

Herbs lend themselves very well to a stately, formal garden such as this one—

Frese

and equally well to a simple, rustic garden.



Buh

Herb gardens are often planted with elaborate intertwining borde called knot gardens. This is the knot garden at the Brooklyn Botan Garden.

This western herb garden is laid out in an unusual pattern lik spokes of a wheel.

Roche

A large garden is not necessary for growing herbs. A few can be grown in pots set in a kitchen window—

Lees

or in a small, sunny corner by a wall.

THROUGH THE YEARS WITH HERBS

. . . an extremely interesting group of plants

Dorcas Brigham

THE enthusiasm for herbs, which followed on the heels of the rock garden craze in America, has made more permanent converts than was thought possible. Perhaps one reason for this is that herbs not only have their roots in the earth, but deep in man's culture and represent many groups of plants.

But, you may ask, what is an herb? The most comprehensive definition would undoubtedly be, 'a plant which has economic properties — culinary, medicinal, or cosmetic—or is grown only for sentimental worth.' This gives the herb gardener plenty of leeway, so he need not feel too restricted. Annuals such as chervil, basil and sweet marjoram; biennials such as foxglove, caraway and angelica; perennials such as lovage, thyme and the mints —these are strictly herbaceous plants. But an herb garden may include rosemary, southernwood and winter savory which are shrubs; saffron (crocus) which is an autumn flowering bulb, and possibly a bay tree in a tub. These are herbs by right of their usefulness either in the past or in the present. As the herb gardener has a wide choice, perhaps it would be best for him to define herbs to best suit his need. Defined or not, this is an extremely interesting group of plants.

Herbs in History

Interest in herbs is no modern development, but down through the ages from the Ebers Papyrus, a medical text of 1500 B.C., through the writings of Theophrastus, Dioscorides and Galen to Vergil and Homer, to Gerarde, Parkinson and Culpeper we may trace the progress of herbs Along with the arts, these plants foun sanctuary in the monasteries through th Dark Ages. The monks of the Benedictin and Cistercian orders collected and cultivated herbs for condiments and medicines. With the break-up of the monasteries, beginning in 1534, many herbs became more widely distributed.

Spices and drugs, as much as gold lured men to search for the shortes routes to far countries. As a result, ne lands were discovered which contribute new knowledge of plants. During the sixteenth and the seventeenth centuries, th early physic and botanic gardens wer established. Many herbals were printed They borrowed heavily from the olde manuscripts and contained informatio of medical usage, folklore and superstition. It is interesting to note in thes herbals that until the seventeenth centur botany and medicine were closely allied New varieties of plants brought in by explorers also were described and some attempts at classification appeared. Man illustrations, although somewhat wooden are realistic enough to be easily identified

Herbs in America

Herbs were brought to America by th early settlers—old family remedies, flavoring herbs and some to put away with th linen, to be strewn on floors or to bur for fragrance. Some of these helped t disguise the taste of old meat before th days of refrigeration; some were used t dye homespun fabrics and some were used as love potions or witches' brews.

They were planted in sunny corners near the house to be available to the busy housewife. As villages grew, many nationalities arrived bringing herbs with them from far-away lands. The resulting exchange of slips and seeds and plants must have been extremely exciting. Later the art of growing and using herbs was dropped, except in Shaker communities where it flourished still in 1950. The Shakers took the lead in the cultivation of drug plants; for example, even as recently as 1935 in New Hampshire, output of valerian oil brought $10,000 annually. They also grew chamomile, wormwood, sage and lovage. A very evident escape, wild bee-balm, covers the hills about the old Shaker village near Pittsfield, Massachusetts.

During the first World War there was a decided shortage of some medicinal plants and products because of the embargo, and the growing of herbs was revived. Mrs. M. Grieve, an Englishwoman, was one who led in this revival and she published, in 1931, *A Modern Herbal*, giving in two volumes the medicinal, culinary, cosmetic and other uses of some thousand plants. The books are well illustrated and have a fund of information about British and American plants. They are excellent reference books, except that the alphabetical index of common names is a drawback because such names differ in various localities and countries. An additional index using botanical names would render these volumes much more useful.

The modern interest in herbs in this country—at least among the garden club members—seems to center in culinary use, in cosmetics, perfumes and potpourri. It is much more satisfactory to leave the administering of medicine to well-trained physicians. The herb garden has become a center of interest, discussion and enjoyment to many, not only because these historic plants reach into the earliest culture of man, but because they are effective as garden plants. Many are fragrant. Many add exciting flavors to the most commonplace dishes.

HERB OR ERB?

A simple four-letter word, *h-e-r-b* has been the cause of much discussion as to its pronounciation. In America one is often considered uncultured if he pronounces the *h;* in England he is apt to be branded a cockney if he drops the *h*.

Until 1475 the word was *erb,* both in spelling and in pronounciation. It came to England from the Latin *herba,* through the Old French *herbe* or *erbe*. At the beginning of the sixteenth century, the Latin *h* was re-attached to the word, but it remained mute until 1800. Since then pronunciation of the *h* has come into use; *herb* is correct in England. American usage still clings to the historical *erb*. Take your choice. When in London, say *herb,* when in New York say *erb;* when in Rome, . . .

HERBS USED BY THE INDIANS AND EARLY SETTLERS OF NEW ENGLAND

Martha Genung Stearns

NO one can trace fully the influences of early centuries—what wanderers arrived on our coasts, either by adventure or by accident; or how long they lingered. But from the herbal point of view there is an interesting interval when the early explorers and commercial adventurers along the New England shores were giving way to the settlers who came to build homes, and established more or less uneasy contact with the Indians. Later comers inevitably brought plants and seed from the home country which were introduced very early into Colonial gardens and grew phenomenally in the fertile virgin soil.

Gabriel Archer, who came with the Gosnold expedition in 1602 and cruised along the coast looking specifically for sassafras, found eglantine, witch hazel, juniper, and wild single roses, and wild strawberries of a giant strain. The Plymouth settlers found herbs known to them, like parsley, anise, pennyroyal, sorrel, watercress, liverwort, wild leeks, a "hollow-leaved lavender" growing in salt marshes, and many more "sweet herbs delightful to the smell, whose names we know not." Also in the 17th century, Christopher Levet spoke of berries and wild fruits, especially the American wild or choke cherry; Sebastian Levet, a Jesuit missionary, discovered in 1689 that he could make candles from bayberries, " a beautiful green wax," mixed with tallow, as substitute for beeswax.

The Indians knew uses for almost every wild, non-poisonous plant. It is rather strange that we have comparatively few herbal remedies from them in New England compared to the West, but the uses of the simple ones they taught the settlers are indicated by the English names given to them. Their lore was chiefly of a domestic kind, such as sumac for tanning and dyeing leather pokeberry for dye and ink, lobelia as a substitute for tobacco (later discovered to be a remedy for quinzy), and milkweed floss and cat-tail fuzz for babies needs. American pennyroyal (*Hedeoma pulegioides*) was their tea, and boneset (*Eupatorium perfoliatum*) their physic

The following list does not cover the field but will give specimens of our native useful plants, all of which are known to modern herbalists, and most of which are in any collector's garden. Some, like dock and dandelion, would be unmanageable, and unnecessary!

Native Herbs

sweet flag (*Acorus calamus*)
baneberry (*Actaea rubra* and *A. alba*)
Jack-in-the-pulpit (*Arisaema triphyllum*)
wild ginger (*Asarum canadense*)
butterfly weed (*Asclepias tuberosa*)
wild indigo (*Baptisia tinctoria*)
black birch (*Betula lenta*)
blue cohosh (*Caulophyllum thalictroides*)
New Jersey tea (*Ceanothus americanus*)
pipsissewa (*Chimaphila maculata* and *C* *umbellata*)
goldthread (*Coptis groenlandica*)
dogtooth-violet (*Erythronium americanum*)
boneset (*Eupatorium perfoliatum*)
wintergreen (*Gaultheria procumbens*)
wild geranium (*geranium maculatum*)
bowmansroot (*Gillenia trifoliata*)
rattlesnake-plantain (*Goodyera pubescens*)
Jerusalem-artichoke (*Helianthus tuberosus*)
American liverwort (*Hepatica american* and *H. acutiloba*)
golden seal (*Hydrastis canadensis*)

(*Continued on next page*)

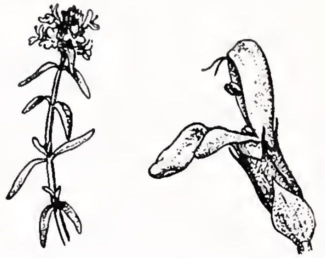
ardinal flower (*Lobelia cardinalis*)
merican wild mint (*Mentha arvensis* var. *villosa*)
orsemint (*M. longifolia*)
okeberry (*Phytolacca americana*)
Solomon's seal (*Polygonatum canaliculatum*)
wild cherry (*Prunus serotina*)
bloodroot (*Sanguinaria canadensis*)
sassafras (*Sassafras albidum*)
rosin weed (*Silphium laciniatum* and *S. perfoliatum*)
goldenrod (*Solidago odora*)
spiderwort (*Tradescantia virginiana*)
trillium (*Trillium erectum*)
meadow rue (*Thalictrum dioicum*)

FAMILIES OF HERBS

—and how to know them

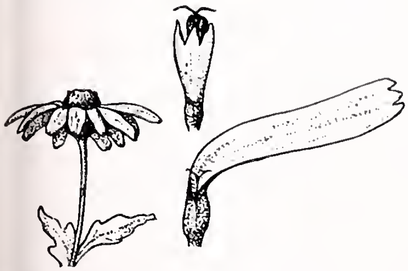
The great majority of herbs commonly grown belong to five large plant families: The mint, composite, parsley (or carrot) and mustard families. Each of these contains many members which differ from one another, yet all the members of any one family show certain "family resemblances" by which they can be easily recognized. The following brief descriptions and drawings point out the most important characteristics of those five families.

1. **The Mint Family** (*Labiatae*) with square stems and mostly irregular, 2-lipped flowers having 4 stamens. The fruit is small, with 4 nutlets ('seeds'). Here we find: mint, basil, sage, ajuga, teucrium, rosemary, lavender, horehound, nepeta, agastache, lamium and thyme.



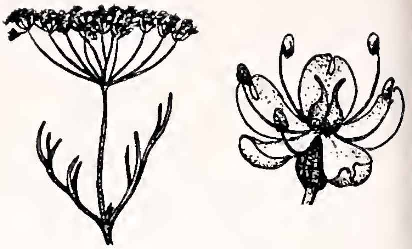
Flower cluster of thyme (left) and a typical flower of the Mint Family enlarged (right).

2. **The Composite Family** (*Compositae*), sun-lovers with 2 kinds of flowers, ray and disk, combined into heads. Fruits are dry and hard, known botanically as achenes; they often have plumes of hairs to aid in wind dispersal. Here are elecampane, chicory, coltsfoot, chrysanthemum, tansy, artemisia, santolina, calendula and eupatorium.

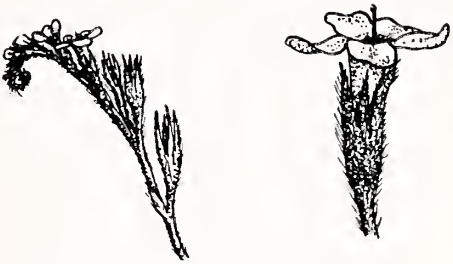


Flower head of a Composite (left), a disk flower enlarged (right, above) and a ray flower (right, below).

3. **The Parsley Family** (*Umbelliferae*), often with hollow stems, flowers in flat-topped clusters called umbels. In this group fall: caraway, chervil, coriander, dill, fennel, cumin, lovage, pimpernel, myrrh, wild carrot, parsley, angelica, goutweed and skirret.



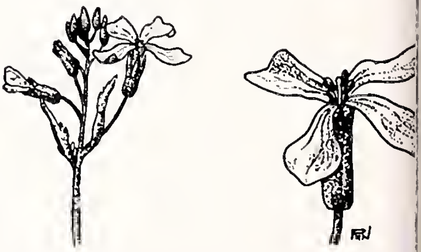
Umbel of flowers typical of the Parsl Family (left) with single flower enlarg (right).



Curved raceme of flowers (left) typical of the Borage Family; single flower (right).

4. **The Borage Family** (*Boraginaceae* with tubular flowers mostly in curve racemes and having 5 stamens attache to the tube. The ovary is superior, usuall forming a fruit composed of 4 nutlet Among the members of this family ar borage, cynoglossum, forget-me-not, me tensia, pulmonaria, symphytum, anchus brunnera, echium and true heliotrope.

5. **The Mustard Family** (*Cruciferae*), has flowers with 4 petals forming a square cross, 4 long stamens and 2 short ones, and superior ovary. Here are: woad, mustard, peppergrass, honesty, upland cress, dentaria, stock and watercress.



Flower cluster and single flower typical the Mustard Family.

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14 No. 3

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Editorial

PAUL F. FRESE, *Editor*
and the Editorial Committee of the Brooklyn Botanic Garden

Brooklyn Botanic Garden photos by Louis Buhle

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Brooklyn Botanic Gard

The tortuous trunks of crab-apple trees lend character to a garden **at any** season, but their charm is particularly evident when snow is on the ground

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Thoughts about Pruning:

Haircuts and trimming of nails are pruning practices that most every civilized Homo sapiens thinks important enough to give his regular attention. Human vanity demands it. But would a person of pride risk a kitchen-style inverted-bowl haircut, or even one by an unskilled barber? Probably not, though the damage done to a head of hair by the most inexperienced novice can be corrected in a week or two by a good barber—for the simple fact is that hair grows a little every day. The interesting point to observe is that even the most careless-about-himself layman recognizes the importance of skill and experience needed to get this sort of job done well.

Now, look at the facts of life in the plant world. A few years ago, the John Doe family built its first home, and employed a not too well informed gardener to put in a foundation planting, a hedge, and several shade-for-the-future trees. The hedge was the first to need care. Hedge shearing, in the main, requires an eye for lines and planes but not necessarily any horticultural knowledge (to save mistakes, see p. 207). Mr. Doe was well equipped to shear his hedge, and did it to perfection. But once under way, he got the hedge-shears itch. The badly chosen evergreens in the foundation planting were obviously too large, even to the inexperienced eye. So he turned to them. The result was the full equivalent of the inverted-bowl technique on a human head. The evergreens with their sheared, rounded domes looked awful, but not to Mr. Doe, because he hadn't developed the knowledge or taste to distinguish between what was horticulturally and esthetically good, and what was bad. He had done to his moderately expensive foundation planting what he would have thought stupid and unpardonable had it been applied to the hair on his own head. Unlike human hair, the badly pruned trees in the foundation planting would grow only for a few weeks each year; quick repairs were therefore impossible. To correct his ill-advised pruning enthusiasm, Mr. Doe tinkered with the planting for a few years afterward. Later, as he acquired horticultural understanding and garden vanity, he had it completely replaced.

The moral is almost too simple: there is no substitute for knowledge, no alternate for skill—which is the reason for this Handbook. Our highly competent authors have made this an indispensible little dictionary on the art and science of pruning.

With this issue, we warmly welcome our new Editor, Mr. Paul F. Frese. At the same time, it is a pleasure to thank departing Editor Peter Nelson (who has gone back to teaching) for his five years of dedicated service to the Botanic Garden and to our Members and Readers everywhere.

Sincerely yours,

George S. Avery, Jr.

Director

PRUNING FOR EVERYONE

Paul F. Frese

ALMOST no ornamental planting of woody plants can go long without pruning if it is to serve its intended purpose in the landscape. Without regular pruning, shrubs become overgrown and formless, evergreens around the foundation of a house obstruct the view from windows, roses become filled with dead stems and do not flower well, and fruit trees get crowded with useless branches and bear poor fruit. In brief, sharp pruning shears, used constantly and intelligently, are probably the most valuable single tool that the gardener possesses.

The art of pruning may be acquired in two ways. First, one must learn the basic principles and also the exceptions to these rules, as they apply to various groups of plants. The second way is through practice and observation. Some people doubt their skill and hesitate to prune anything for fear of making a mistake. Others prune everything in sight with a heavy hand. It is a wonder that the plants survive such butchery!

Fortunately most plants recover from pruning at a rapid rate. New growth has a way of correcting and covering errors. No one should hesitate to follow a trial and error method where specific rules cannot be found. It is often better to prune moderately than not at all.

The greatest error in pruning is to delay too long in controlling the form of young plants. A heavy investment in foundation evergreens, for example, can be lost within a few years if the plants are allowed to grow, unpruned, to such large size that they crowd each other, get too large for the space, and become bare-stemmed at the base. At this point, no amount of pruning can restore the plants to proper size and shape. The only recourse then is to rip them out and buy new ones.

Pruning is more than the orderly process of cutting off dead and unwante branches and controlling the overall shap of the plant. Today, more people tha ever before are learning to discover ne beauty in the forms and silhouettes o plants. This is revealed in a number o ways. Surely, training all sorts of plant as espaliers has never been more popula than it is now. Vines, shrubs, small frui trees and tropical plants are being grow on supports, not only in conventional patterns but also in other designs which sui the location. The trunks of shrubs, evergreen and deciduous trees and othe plants are now revealed, through prunin away fine branches, so that the pattern o the trunks, their shadows cast agains walls or paved surfaces, become an important part of the landscape design Thus pruning becomes an artistic expression.

The way plants will respond to prunin

Pruning preserves the landscape design

Gottscho-Schleisne

Frese

Pruning and trimming are basic techniques that give this garden a distinctive quality

can often be determined before the cut is made. When a part of a plant is cut off, the general response of the plant is to make new growth at or near the cut. All new shoots begin with buds. Sometimes the long-dormant buds nestled at the base of a leaf-stalk (axillary buds) are visible. In other instances, new buds form below the bark near where the cut was made (adventitious buds); or, they may occur at a node or joint of the stem.

New shoots are likely to start close to the point of pruning. And the new stems will grow in general in the direction the bud points. The rapidity of growth, of course, will vary with the severity of the pruning and the nature of the species or variety.

Keeping these factors in mind, one may plan the pruning in such a way as to regulate with surprising accuracy the size, shape and extent of growth of a plant.

No one printed guide to pruning can include all information on the subject, but in this book not only are specific instructions given for pruning major groups of plants but also examples of controlling their form so that the plants will be more interesting and useful regardless of where they grow.

PRUNING ORNAMENTAL SHRUBS AND SMALL TREES

James H. Beale

PRUNING is recognized as a necessary part of good fruit culture, but that it is equally important in the proper care and cultivation of ornamental trees and shrubs is not so clearly understood. No orchardist worthy of the name would allow fruit trees and berry bushes to grow as they please and still expect to produce acceptable fruit in any quantity.

Granted, that in the case of the orchardist the object is quality fruit production, whereas with ornamental trees and shrubs an abundance of flowers is the common objective, but not only their quality but also their quantity can usually be increased by proper methods of pruning.

Pruning can be taken to mean the removal of unwanted growth, and the reasons for its removal can be broadly summarized as:

To produce more or better bloom and or fruit.

To develop or maintain a desired shap or size.

To rejuvenate, by taking out olde stems to encourage vigorous young on to take their places.

To repair injuries.

To remove parts that are diseased seriously injured by insects, such as fir blight, stem borers, scale insects, etc.

To establish a balance between root an branch systems after transplanting, pa ticularly with shrubs or trees moved wit bare roots.

To remove dead wood or that which winter-killed.

Pruning Tools

Pruning tools should be adapted to th work they must perform, be of good stee and above all, always kept sharp. Har pruning shears come in sizes 7 to inches long, with the heavier types to preferred as their cutting blades are n so easily strained. Pruning saws 12 to inches long are large enough for mo shrub and small tree work, and those to 26 inches for large tree limbs.

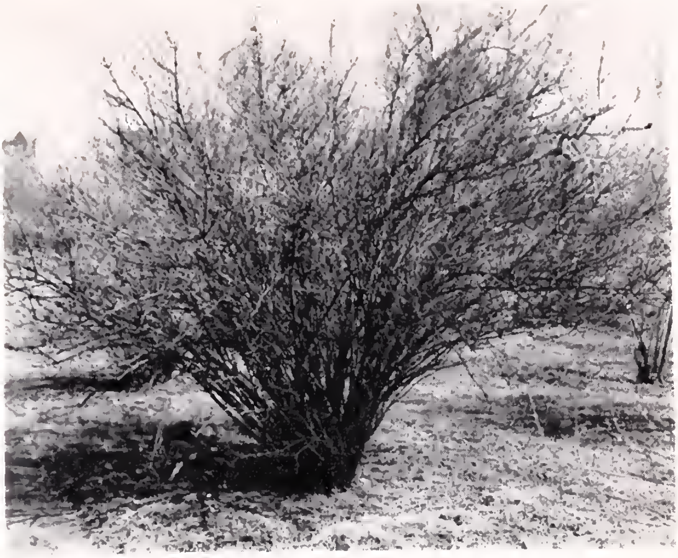
There are many occasions when thi stems must be cut out at the base of lar shrubs where it is not possible to use pruning saw (due to the position of the stems), and hand shears are not suf ciently powerful. Lopping shears a then necessary. These have handles fro

McFarland

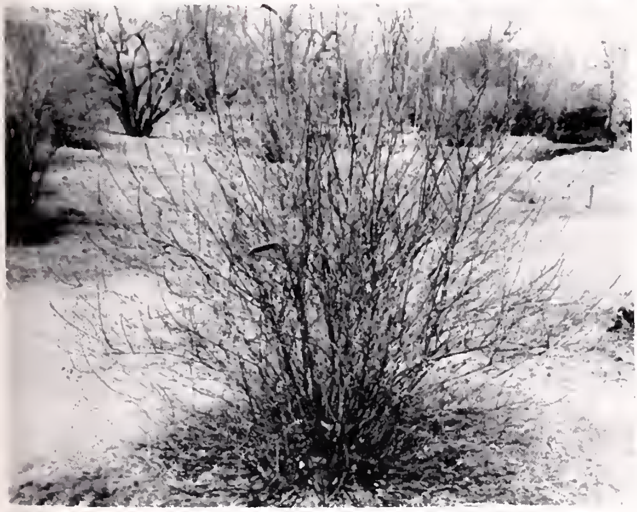
Shrub althea may be kept to one trunk a pruned to a uniform, compact shape

Shrub Before Pruning

This typical overgrown shrub needs rejuvenation that can come only from heavy pruning. Such plants bloom poorly unless they are pruned



Brooklyn Botanic Garden photos



After Pruning

The old wood was cut to the ground, and the young growth shown here replaced it within two years, to make a shapely, vigorous shrub

20 to 36 inches long, which give good leverage on the cut; they also have cutting blades strong enough to cut stems ¾ to 1½ inches in diameter. A heavy pruning knife is desirable if for no other purpose than to smooth surfaces cut with a saw, but it has many other uses such as tip pruning of evergreens. The principal use for hedge shears is for shearing hedges, but too often they are indiscriminately used on all kinds of flowering shrubs, a practice to be condemned.

For trees, a pruner and saw attached to a pole 8 to 16 feet long, are needed. Pole saws are not well enough known among amateurs.

Seasons for Pruning

So far as it concerns ornamental shrubs and small trees, pruning is largely confined to two periods, (1) when they are dormant, i.e., before growth begins in spring, or (2) immediately after flowering.

Most shrubs and small trees which

bloom *before* the end of June in temperate climates do so from flower buds formed in the previous year, and to prune them before they bloom may mean cutting off the greater part of the flower-bearing shoots. Such shrubs, therefore, are pruned after they bloom.

Shrubs which bloom *after* June usually do so on shoots that have grown in the same or current year, and so have ample time in which to make their flowering stems and, consequently, are pruned while they are dormant.

Dead, diseased, or seriously insect-injured wood should be cut out as soon a noted or decay and injury may extend t other parts of the plant.

Shrubs Pruned When Dormant

These may be pruned during winte except in regions of severe cold, thoug in any case it is generally advisable t delay it until late February or March i order to avoid possible frost injury afte pruning. The extent of pruning will depend upon the kind of shrub.

To be pruned every year:

COMMON NAME	BOTANICAL NAME
*Butterfly-bush	*Buddleia* (except *B. alternifolia*)
Beauty-berry	*Callicarpa*
Heather	*Calluna*
*Bluebeard	*Caryopteris*
*Elscholtzia	
Shrub Althea	*Hibiscus syriacus*
*Hills-of-Snow Hydrangea	*Hydrangea arborescens grandiflora*
Peegee Hydrangea	*H. paniculata grandiflora*
*Indigo	*Indigofera*
Bush Clover	*Lespedeza*
*False-spirea	*Sorbaria* (prune *S. aitchisoni* lightly)
*Tamarisk	*Tamarix* (except *T. parviflora*)
*Chaste-tree	*Vitex*

*Prune to near the base of previous year's growth.

Items not starred may, but need not be so severely cut, except Shrub Althea with which to avoid a mop-like appearance, all shoots should not be cut at the same height.

Heather may be sheared.

Pruning the Spireas

The following spireas, and others of similar summer-flowering habit, should have many of the oldest stems, and also small, weak ones, cut out at ground level, and the shoots of the previous year cut back about half their length. In order t obtain ample new growth they may occasionally be cut to the ground, and stil produce flowers in the same year. Thi pruning is done in early spring.

Anthony Waterer Spirea	*Spiraea* 'Anthony Waterer'
Billiard Spirea	*S. billiardi*
Bumalda Spirea	*S. bumalda*
Douglas Spirea	*S. douglasi*
Japanese Spirea	*S. japonica*
Willowleaf Spirea	*S. salicifolia*
Hardhack Spirea	*S. tomentosa*

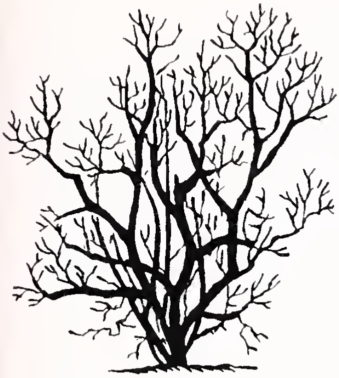
Shrubs With Brightly Colored Stems

Some shrubs are grown, usually in masses, for the winter color of their stems, and as the color is most pronounced in the young stems, they are cu back to near the stump every year jus before growth commences in the spring

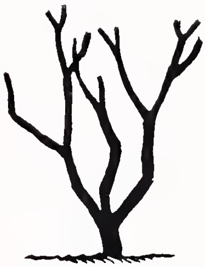
Tatarian Dogwood	*Cornus alba* (stems blood-red)
Siberian Dogwood	*C. alba sibirica* (stems brighter colored than in *C. alba*)
Red-osier Dogwood	*C. stolonifera* (color not as good as in either of above)
Golden-twig Dogwood	*C. stolonifera flaviramea* (yellow stems)
Kerria	*Kerria japonica* (bright green stems)

The general pruning procedure, illustrated below for crape-myrtle, applies to many other large shrubs and small trees of similar structure

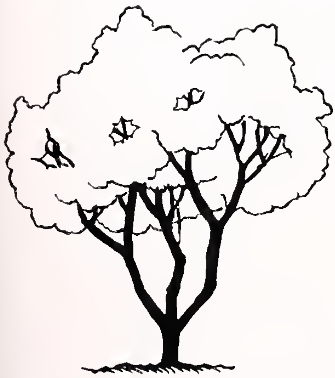
Proper Method of Pruning Crape-myrtle



This plant, pictured before pruning, needs o have all weak and dead stems removed



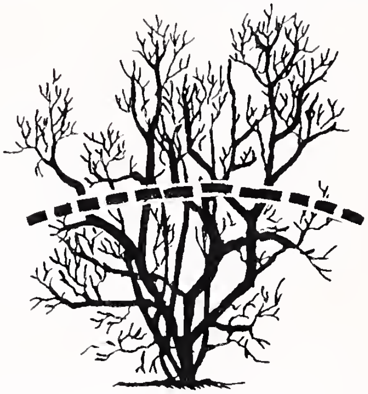
Same bush after removal of weak and interfering wood, also base sucker growth



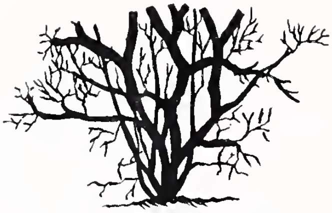
Results of proper pruning: graceful, vigorous growth with distinctive shape

Diagrams courtesy City of Norfolk, Va.

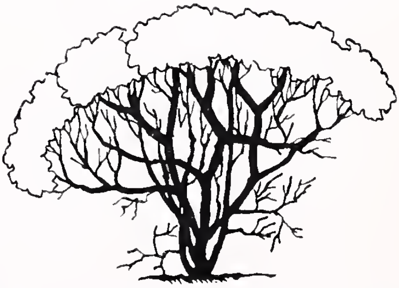
Improper Method of Pruning Crape-myrtle



Cutting at the dotted line is the usual course taken by those who ''prune'' shrubs



The same plant after bad pruning, as indicated above. The sucker growth remains



Result: the lovely natural shape of the shrub is lost, and bloom will be sparse

To Be Pruned Immediately After Flowering

This group includes some of the most beautiful spring flowering shrubs, but too often their ornamental value is spoiled by pruning them when they are dormant, in which case the flower buds are removed. Since the fruits of most of them have little or no ornamental merit, nothing is lost by pruning after flowering. On the contrary, all the strength will go into stronger shoots and better flowers the following year. The seed-pods of beauty-bush and ninebark, however, have some decorative value, and if they appeal the home owner, plants may be period cally thinned instead of being prune annually.

For this group, pruning consists cutting off that portion of the stem which bore the flowers or flowering twig and of cutting out at the base, or back a vigorous young shoot, some of the ol est stems, to encourage strong growth young ones from the base of the shrub.

Fountain Butterfly-bush	*Buddleia alternifolia*
Deutzia	
Forsythia	
Winter Jasmine	*Jasminum nudiflorum*
Kerria	
Beauty-bush	*Kolkwitzia*
Mock-orange	*Philadelphus*
Ninebark	*Physocarpus*
Garland Spirea	*Spiraea arguta*
Reeves Spirea	*S. cantoniensis*
Bridal Wreath Spirea	*S. prunifolia plena*
Thunberg Spirea	*S. thunbergi*
Korean Spirea	*S. trichocarpa*
Veitch Spirea	*S. veitchi*
Vanhoutte Spirea	*S. vanhouttei*

and other spring flowering kinds

Lilac	*Syringa* (always cut off spent flower-heads)
Small-flowered Tamarisk	*Tamarix parviflora*
Weigela	

Euonymus pruned to silhouette branches

Gottscho-Schleisner

Pruning Shrubs With Ornamenta Fruits

A third group is more highly regard for its autumn fruits than for spri flowers. An occasional light dormant se son thinning out, or the cutting out stems which are old or weak, or rubbi together, is much to be preferred to a systematic shoot or branch prunin Many of the stronger growing shrubs i cluded in this group will go for seve years with little pruning beyond th needed to keep them neat, but not fo mal, in appearance.

Barberry	*Berberis*
Smoke-tree	*Cotinus*
Flowering Quince	*Chaenomeles*
Cornelian Cherry	*Cornus mas*
Japanese Cornel	*C. officinalis*
Gray Dogwood	*C. racemosa*
Cotoneaster	
Elaeagnus	
Euonymus	

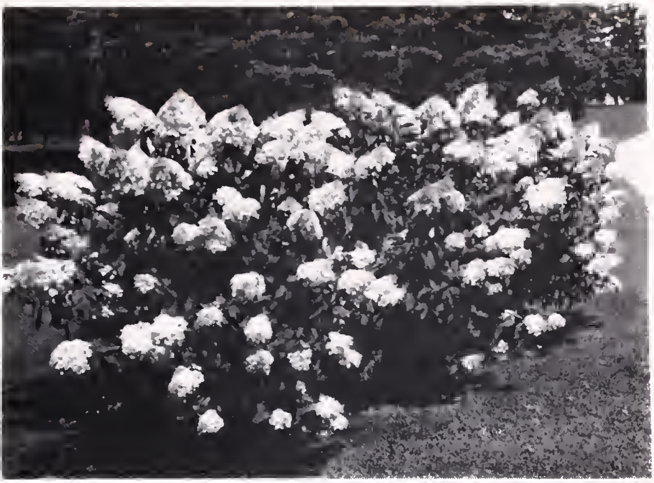
Shrub-form Hydrangea

When peegee hydrangea is pruned to branch low, flowers cover the entire plant to the ground

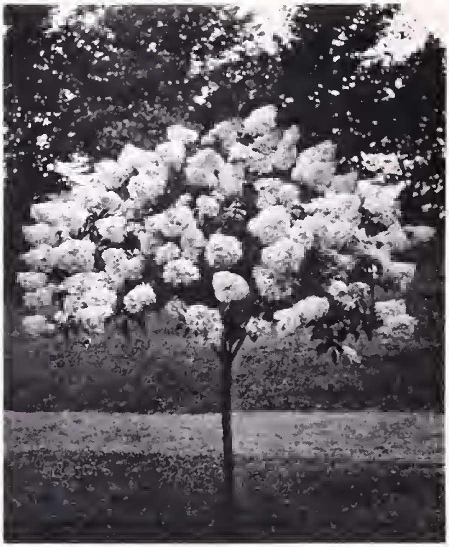
McFarland

Tree-form Hydrangea

By training young peegee hydrangeas to one main trunk, the plant produces a tree-like head as shown below



Shrub Honeysuckles	*Lonicera*
Bayberry	*Myrica*
Photinia	
Firethorn	*Pyracantha*
Jetbead	*Rhodotypos*
Rose (species)	*Rosa*
Bladdernut	*Staphylea*
Snowberry	*Symphoricarpos*
Viburnum	



Pruning Small Flowering Trees

There are a number of comparatively small flowering trees, several with the additional attraction of showy autumn fruits. Not infrequently some of them are nothing more than large shrubs, depending upon whether they are allowed to develop a number of approximately equally-vigorous branches near the ground instead of being pruned to form a definite trunk or central axis. This is not uncommon, for example, in the native flowering dogwood. But when a young tree is bought with a single trunk it is generally desirable to maintain it in that form by cutting off any shoots that may arise on the trunk below the branches that were already there.

For these small trees there is little need for annual pruning, though their characteristic shape should be maintained by shortening any branches that grow too rapidly in comparison with the remainder, and, in their early years, by cutting out any branch that may compete with the leader, i.e., the upper part of the trunk. As a general rule, the leader should not be shortened. Sucker growth at the base of the trunk should be removed, for with grafted plants (particularly pink and rose colored forms) such growth may be from the understock, and if not checked it could in time outgrow the grafted portion.

Branch shoots that grow up into the head of the tree, rather than horizontally, or those which are rubbing together, should be cut out. When shortening branches, cut back to a bud or to a shoot pointing in the direction in which a new branch is desired. For more or less horizontally branched trees select a bud or shoot on the side, not on the top of the branch to be pruned. Any of this pruning can be done in the season of dormancy. In this group are:

Shadblow	*Amelanchier*
Redbud	*Cercis*
White Fringe-tree	*Chionanthus*
Pagoda Dogwood	*Cornus alternifolia*
Flowering Dogwood	*C. florida*
Kousa Dogwood	*C. kousa*
Hawthorn	*Crataegus*
Russian Olive	*Elaeagnus angustifolia*
Franklinia	
Silverbell	*Halesia monticola*
Goldenrain-tree	*Koelreuteria*
Goldenchain	*Laburnum*
Magnolia	
Crab-apple	*Malus*
Sorrel-tree, Sour-wood	*Oxydendrum*
Mountain-ash	*Sorbus*
Asiatic Sweetleaf	*Symplocos*

Pruning Shrubs and Trees After Planting

When shrubs and trees are taken up in a nursery with bare roots, i.e., without a ball of soil attached, they usually have a considerable portion of their root systems cut off in the digging, and as a result are ill equipped to maintain the branch systems they have previously developed. To compensate for this loss of roots, considerable pruning may be needed after they are planted. The removal of about one-third of the total growth is usually sufficient, but if the root system has been considerably reduced, then it should be more extensive.

For shrubs which naturally sprou from the base, e.g., spireas, deutzias mock-oranges, etc., one or two older stems may be cut out at base, and the remainder shortened about a third. Shrubs with permanent stems, e.g., smoke-tree Cornelian cherry, some viburnums, etc. may have some of the weakest growth thinned out, and the stronger branches shortened. Most small trees have their branches cut back about a third to a half but a pleasing outline should be maintained. This is to be preferred to cutting out some branches completely, as any thinning out, if necessary, can be done at a later time.

Trees and shrubs with the roots in a ball of soil wrapped in burlap ("B & B" usually require little if any pruning a the time they are planted.

HOW TO PRUNE LILACS

Alys Sutcliffe

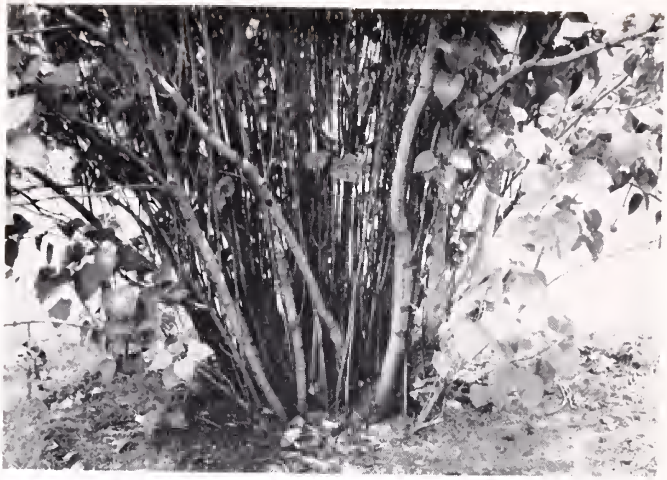
In caring for the extensive lilac collection of the Brooklyn Botanic Garden, we have continually rejuvenated our old plants which have grown too tall and leggy, and also those in which the main trunks have become seriously damaged by borers. The technique is drastic pruning, carried out every few years. This can be done as soon as they finish flowering so that the plants have time for the new growth to strengthen and form dormant buds for the following year.

Old lilacs can have their branches cu down to a young side shoot near th ground, or right to the ground if ther are one or two strong main shoots.

When there are a great many shoot coming up from the ground, all but thre or four of the strongest of these shoul be pruned off. These will in time tak the place of the old wood which is cut out

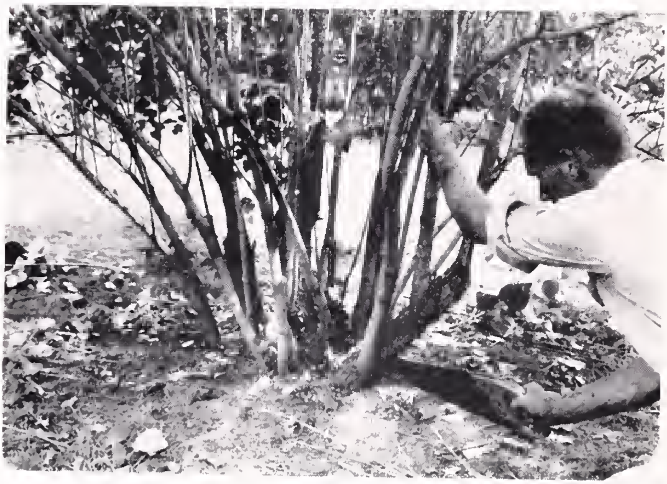
Wherever there are a great man young shoots or suckers growing on th lower part of flowering branches, most o

Step by Step Guide to Lilac Pruning



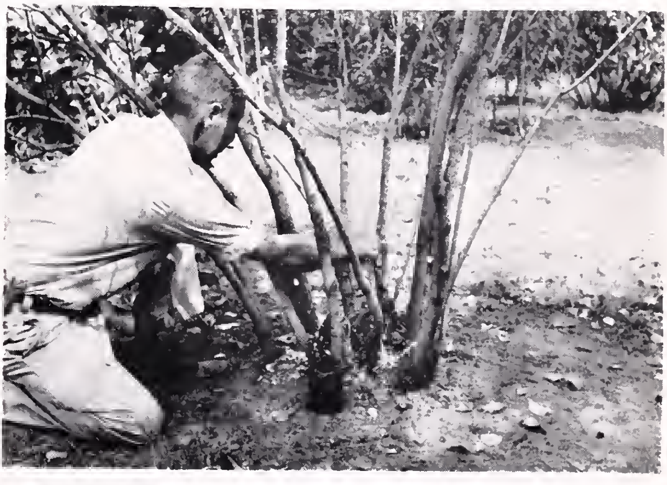
Before pruning

Lilacs generally become crowded with suckers and old heavy stems



After thinning

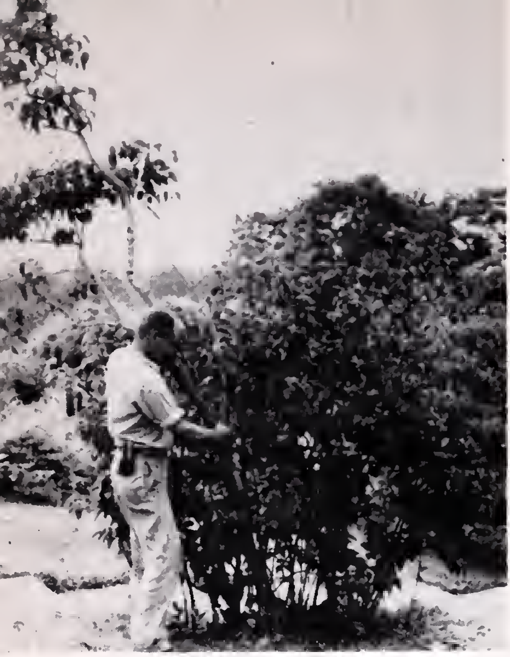
Here, all the sucker growth has been pruned to the ground, and now an old overgrown trunk is to be cut away



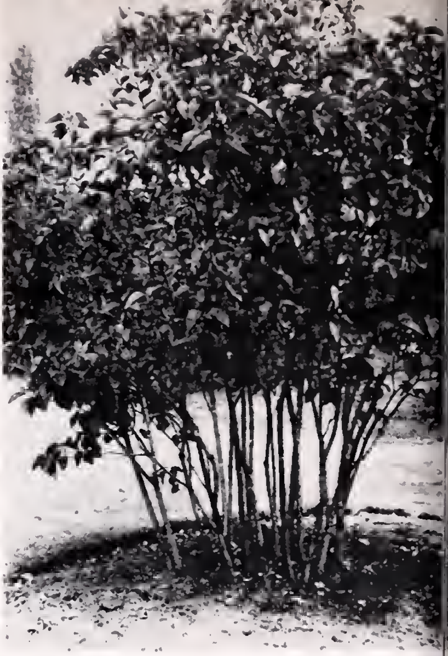
Pruning finished

This lilac now has the potentialities of a graceful shrub, and will flower well. Cut areas are being treated with tree paint to prevent rot

Brooklyn Botanic Garden photos



Tall, old stem of lilac being removed to balance plant and encourage new growth



Brooklyn Botanic Gard

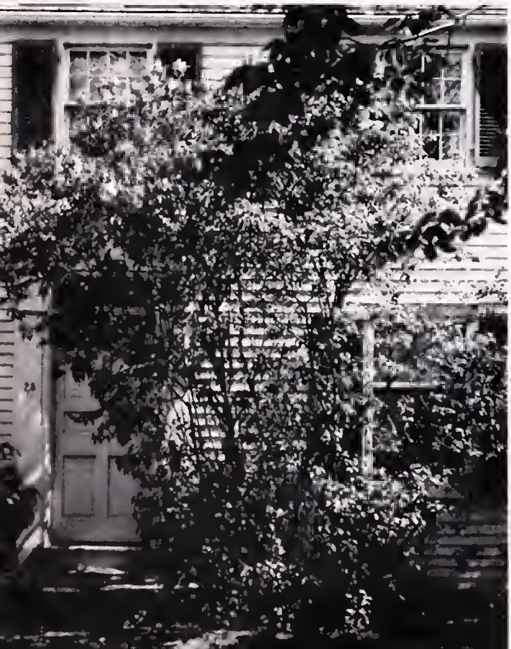
Thinned lilac clump now is ready for severa years of good bloom and growth

METHODS OF THINNING OLD LILAC CLUMPS

them should be removed or the bushes will become a mass of green and have few flowers.

Young lilacs usually can be kept to the desired height by cutting fairly long stems when flowers are gathered fro the plants or in cutting off the dead flower clusters which is a chore that *shoul* be done to keep the plants tidy an strong growing.

Form of old lilac is obscured by suckers



After pruning, stems cast shadow patter

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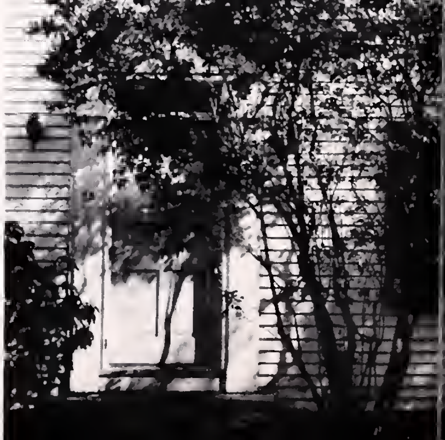


HISTORIC TOPIARY

Elizabeth Hess

TOPIARY work, the art of clipping shrubs and trees into ornamental shapes, enjoyed great popularity in the 16th Century and probably reached its peak of perfection in that period which has been referred to as "The Golden Age of Topiary."

It was, however, known and practiced freely by the Romans and there are many references to the art of topiary in the writings of that time. Poets and philosophers wrote at considerable length about it, and those who travelled were responsible for the spread of the fashion throughout the Roman Empire.

One of the most extravagant periods in garden design and ornament was between 1669 and 1685, when those who could afford it vied with each other to be more novel and often more peculiar in the design of their gardens. Labyrinths, mazes and mounts were laid out, magnificent parterres, flights of steps turfed and carefully clipped added to the grandeur of these extensive gardens. Thousands of pounds were spent on extravagant ornamentation, elaborate fountains, great marble water-basins, and an abundance of masonry, and in this type of setting the clipped and formal yew and box added stateliness and a certain quiet beauty.

The Decline of Topiary

Whenever any fashion is carried to excess, its days are numbered. So it was that in the early 18th Century, when nearly every large estate had its collection of topiary pieces, there was a revolt against undue formalism and a reaction to topiary work in general.

As a result of this reaction there was an almost wholesale demolition of topiary work and much that was interesting historically fell to the axe. Fortunately, however, some quite famous gardens escaped the general slaughter and we have in England today some good collections of topiary which are still well maintained.

Examples at Levens Hall

One of the most famous of these is at Levens Hall in Westmorland, the gardens which were laid out by Monsieur Beaumont, a pupil of LeNotre in 1689. The existing beech hedges and most of the topiary in this garden are original and visitors to the north of England interested in gardens should make a special effort to see Levens Hall.

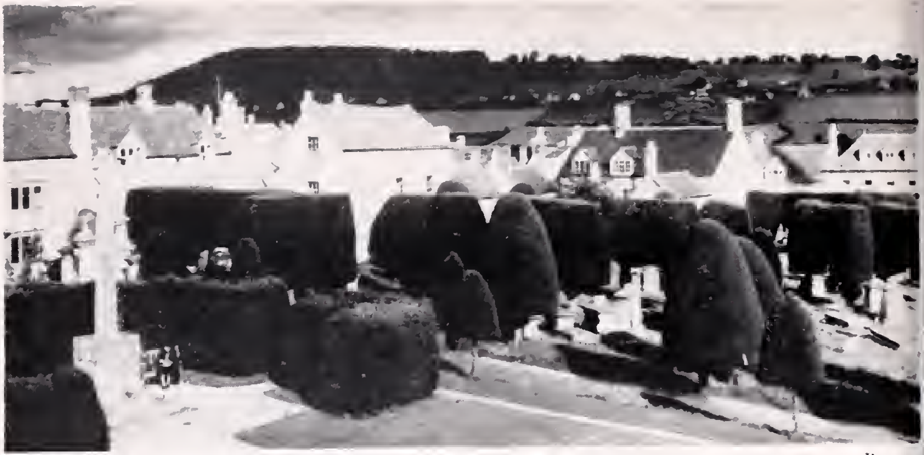
Many of the specimens are of clipped yew and box and one pair of chess pieces is 20 feet high. Two umbrellas which dominate their neighbors are each 30 feet high and 12 feet wide. One of these umbrellas was planted long before the gardens were laid out and is said to be nearly 1,000 years old. The beech hedges at Levens are 100 yards long, 15 feet high and 12 feet wide.

Queen Elizabeth I with two ladies in waiting is represented in boxwood, a crowned lion gazes serenely at a sitting bird on a pillar, whirls, balls and spirals, and grotesque shapes of all kinds remind one of a bygone age when labor was cheap and when the desire for novelty got somewhat out of hand.

The Contemporary Scene

Topiary work can and often does find its place in the contemporary garden, and doubtless the electric hedge trimmer has made this possible.

It is unfortunate that yew and boxwood are not hardy in many parts of the United States. Certainly no one wants to go to the trouble of clipping bushes into shapes if they are going to be winter-



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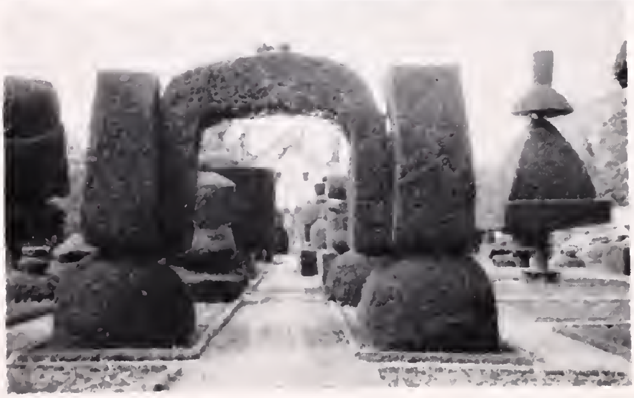
This old planting of 100 topiary yews i Painswick, England, is kept in perfect tri with electric shears—see at left



The Topiary Gardens at Levens Hall, England

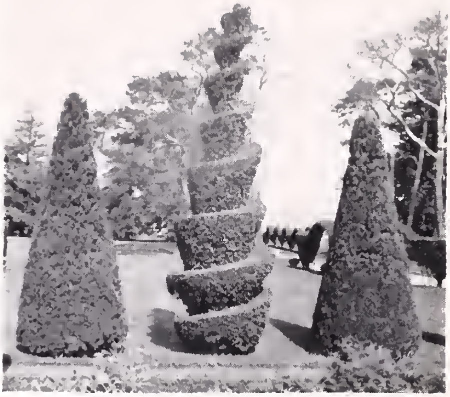
Some of the clipped piec in this remarkable colle tion are between 20 and feet high. This is one the most famous topia gardens in England

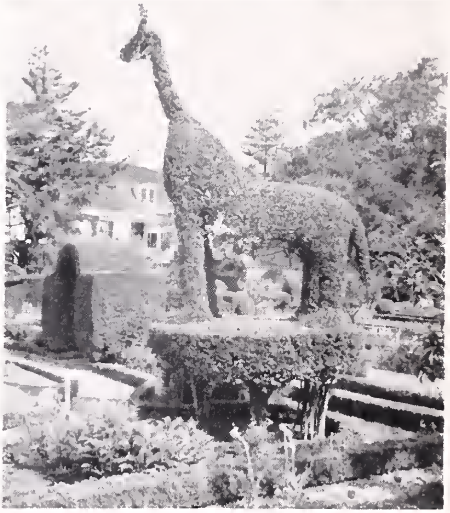
O. R. Bagot

killed. Beech and hornbeam can be used for hedges and arbors, but are not really suitable for genuine topiary work because they are not evergreen.

Where yew, boxwood and privet are hardy they should be planted as young, well grown bushes about 2 or 3 feet high. Clipping should then begin in the following year in the fall. The general policy should be that if a large shape is wanted the bush should be allowed to grow into a reasonable size before clipping begins, but if only a small shape is required, clipping can begin in the year after planting. The yew is easier to manage than boxwood and with care and patience almost any shape can be obtained. A good stout stem or stems at the base is important and it is better to do without iron or wooden frames, if possible, because these rot or rust eventually.

The easiest shapes to manage seem to be spirals, balls and squares. Present-day taste in garden ornament would not, I think, appreciate bottles, jugs and umbrellas, or even peacocks. The part that

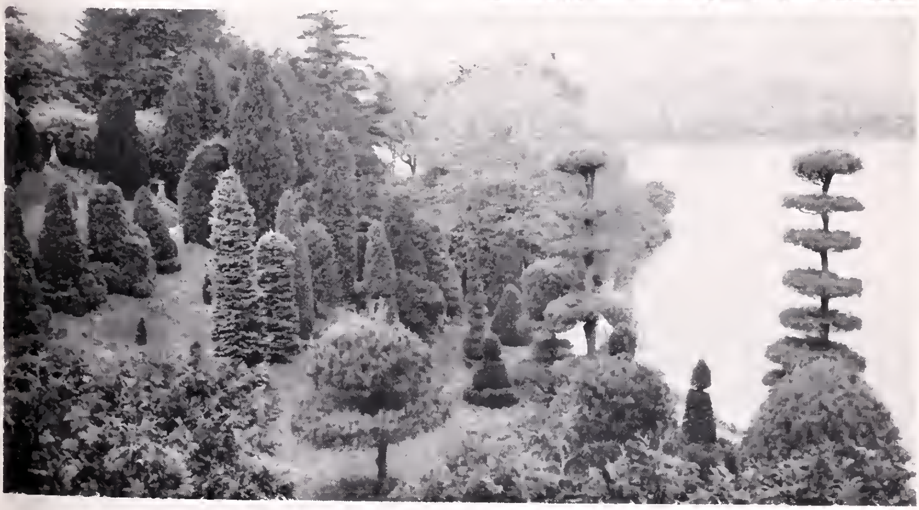




Topiary in America

Purely architectural forms as well as animals, including the giraffe, are found in the collection of Miss Alice Brayton in Portsmouth, Rhode Island. Below is a section of Mr. Walter Hunnewell's famous garden in Wellesley, Mass.

Genereux



topiary can play in the present-day garden is to enhance existing features. A well trained arch in yew, box or beech can be a very pleasing sight and here the iron frame can be of great assistance in the training of the trees. Hedges should be clipped lightly until they have reached the desired height and then the clipping must be carefully and regularly done to maintain good shape. In the case of a beech hedge, the leading shoots should not be shortened until the desired height has been achieved, otherwise it will take a very long time to obtain a reasonably high hedge. All other hedging plants should be clipped regularly while young in order to encourage growth at the base. As with topiary work, hedge material should be left unclipped for a year after planting.

Preparation and Maintenance

Few people realize the necessity for proper preparation of the beds for hedges and topiary work. Yew is a gross feeder and good preparation of the soil with manure or leaf mold will enable the bushes to make vigorous growth in the early stages which can be easily trained. Yew grows well in limestone and does well even on a poor, hungry soil, though the growth is slower and plants take longer to become well established.

It will take some years to obtain really good specimens, depending on how ambitious is the planting plan. Four or five years after planting should show some development of the simpler shapes, and the balls, squares and spirals, if not required to be very large should have become recognizable shapes in that time. Many more years of care will be required for the more elaborate shapes, some of which are not sold from nurseries until they are 15 or 20 years old. The actual training is done by regular clipping, though some wiring may be necessary for the more unusual shapes.

When beech is used to form an arch, the branches from each side may be tied together with string overhead, and wil eventually grow together without any assistance.

When clipping a hedge, it is always wise to use a line pegged at the right height. Electric or hand shears should be used but great care is required so that the correct shape is maintained and that the shears do not bite into the hedge leaving holes.

Clipping should be done in the autumn except for holly and boxwood. Holly is not a particularly desirable subject for topiary and is not easy to clip, but where it is used it should be clipped severely in May or June every other year, and in alternate years a very light pruning is all it requires, as a rule. Box must no be clipped until all danger of frost is over, otherwise it might be killed outright.

If branches tend to grow out of position they should be tied back into shape and care should be taken to see that snow does not lodge on the branches during winter.

Apart from the clipping of shapes and hedges, there is not much labor attached to an established topiary garden, but much time has to be spent in the early stages to achieve the desired form.

Brimer

Hedges in the parterre garden of the Chateau de Villandry in Loire, France, ar clipped box; corner pieces are yew

Gottscho-Schleisner

Rhododendrons look best when they are kept at a suitable size through pruning

HOW TO PRUNE BROAD-LEAVED EVERGREENS

To shape them for year-round decorative effect and to encourage flowering and fruiting

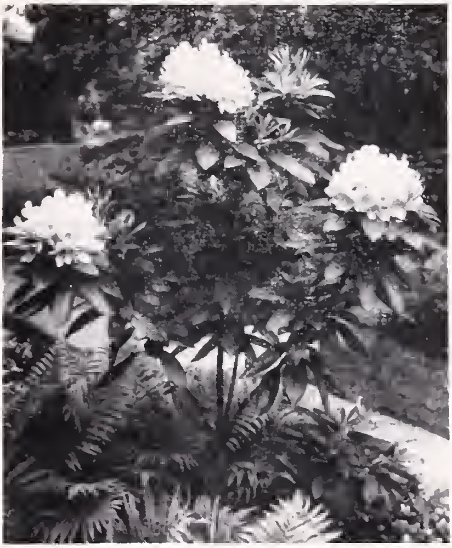
Francis de Vos

BROAD-LEAVED evergreens, if not cared for, may become so poorly shaped as to be unsuitable as ornamentals. Judicious pruning to control size, shape and compactness also results in healthier, more vigorous plants. The following considerations and practices are applicable to a wide number of broad-leaved evergreens.

Most broad-leaved evergreens can tolerate considerable shade but will, regardless of care, become spindling when grown in heavy shade. The best site for any particular broad-leaved evergreen is the one which develops the best qualities for which it is being grown—foliage, flowers, or fruit. Because light conditions favorable for optimum flower and fruit production do not always result in best foliage effect, it is necessary to select a compromise site that will produce the best all-round plant. The problem of spindling or leggy plants growing in heavy shade is best met by proper selection of site rather than relying on the temporary correction afforded by pruning.

Heavy nitrogen fertilization often results in the production of excessive shoot elongation, succulent growth, and reduced flowering and fruiting and ultimately in a poorly shaped plant. Since these conditions are precisely the ones that pruning is designed to correct, it behooves the gardener to be cognizant of this fact.

The practice of "pinching out" the soft tip of shoots on very young plants is actually a form of pruning. By removing the tips (one-half to 1 inch) of young shoots when plants are scarcely more than rooted cuttings or young seedlings, it is possible to develop compact plants with branches near the ground level.



Removing Foliage and Flowering or Fruiting Branches

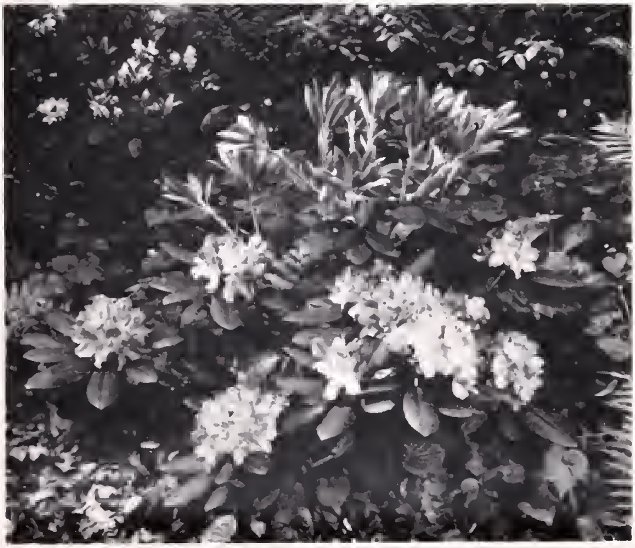
It is common practice to remove foliage, flowers or fruit from broad-leaved evergreens for use in decorating the home. The selective cutting of berried holly branches at Christmas time, of magnolia foliage during the winter, or of azalea flowers is a way to derive extra pleasure from one's plants and at the same time do whatever pruning may be necessary.

Sanitary Pruning

Dead or weak wood should be removed not only for the sake of appearance, but because of its effect on the future health of the plant. Plants cluttered with weak and dying wood often become heavily infested with insects or infected with disease-producing organisms that spread to the rest of the plant or to surrounding plants.

Time to Prune

Most broad-leaved evergreens should be pruned just before new growth starts in



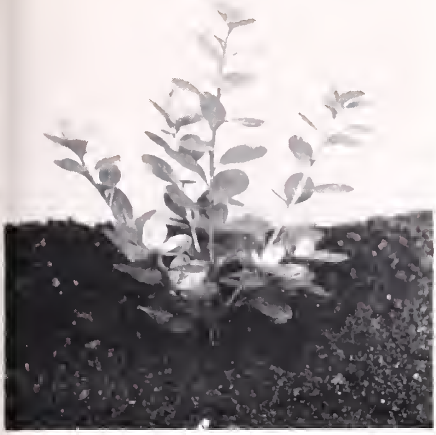
Unpruned Plant (above)

Rhododendrons which were not tip pruned at an early age grow tall and leggy, with few branches and blooms

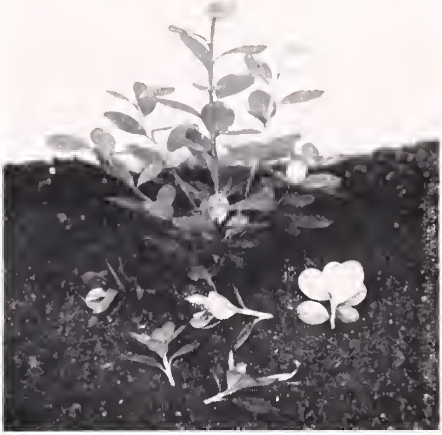
The Effect of Early Pruning (left)

Plants pruned when young have numerous low branches, giving a full foliaged effect and a greater abundance o flowers

McFarland



Young azalea plants before the tips of branches were pruned off



Author photos

The same plant after pruning to induce compactness (note prunings on the ground)

the spring. Such plants as mahonias, *Camellia japonica*, *Leucothoe catesbaei*, and *Kalmia latifolia*, which have fully developed flower buds going into winter, should be pruned immediately after flowering.

Pruning or shearing broad-leaved evergreen hedges of boxwood or holly is best done after the current-season growth is complete. If new shoots are headed back at 6- to 8-inch intervals until the desired height is reached, and then cut back to within one bud after each year's annual increment of growth, a compact low-branching hedge that increases slowly in height will result.

Special Plants

Azaleas. Pruning of azaleas is limited to "pinching out" the tips of shoots on young plants and the "heading back," or removal, of older branches on open "leggy" specimens.

Azaleas develop their maximum compactness if one-half to 1 inch of the tips of new shoots are pinched out after the shoots have elongated to 2 to 4 inches. If this practice is carried out once or twice a year until the plants are 3 years old, well-rounded plants with branches close to ground level are produced.

Older plants that have become "leggy" or young plants with occasional maverick shoots should be cut back after flowering or before growth starts in the spring to within 6 inches of the ground level. This type of pruning is called "heading back" and usually stimulates growth of dormant side buds on the remaining stump. In cases where numerous shoots appear, only two or three shoots should be allowed to develop. These shoots, in turn, should be headed back to induce further branching.

Camellias. Camellias are pruned to correct irregular branching, to remove weak wood, and to obtain larger flowers.

Very little formative pruning is required on camellias because they naturally are compact and symmetrical in shape. This is particularly true of most varieties of *Camellia japonica.* Many of the fall-blooming varieties of *Camellia sasanqua,* however, tend to be more irregular in growth and require frequent pruning to keep them reasonably compact. The occasional wayward branches that interrupt a plant's symmetry should be pruned back to the length of other branches. This pruning is best done before new growth begins in the spring, but may also be done at flowering time if one desires to use the flowers in the home. In the case of sasanqua camellia, this would mean fall pruning.

It is frequently desirable to cut out weak wood that tends to accumulate in the interior of large camellias. This weak wood not only detracts from the plant's appearance and harbors insects and disease-producing organisms, but also makes it difficult to attain complete coverage of foliage and branches when spraying is necessary.

Disbudding camellias to obtain larger flowers is actually a form of pruning. Varieties that tend to produce multiple flower buds at the ends of their twigs can be disbudded so as to leave a single terminal bud. Disbudding should be done as soon as flower buds are distinguishable in late summer.

Rhododendrons. The most commonly practiced form of pruning rhododendrons is the annual removal of flower clusters once the flowers have faded. By preventing seed formation, growth of side shoots that result in a fuller, more compact plant is encouraged.

Old "leggy" rhododendrons may be severely pruned just before new growth starts in the spring. Stems an inch or more in diameter, when cut to within 6 inches of the ground level, will produce new shoots from adventitious buds on the remaining stumps.

Other Kinds. Barberries, cotoneasters, and evergreen firethorns are grown for fruiting effect as well as for their foliage and general decorative value. These species should be pruned only to induce compactness in their young stages or to maintain them in scale with their surroundings. Any further pruning tends to impair fruit display, since flowers are usually produced on wood of the previous season.

Firethorns (pyracantha) usually need special attention if reasonably compact plants are desired. During the first and second year after planting they frequently develop unbranched leading shoots 4 to 6 feet long. These shoots can be headed back by half their length just prior to growth in the spring, or their tips can be cut out when their growth is half complete.

Pruning broad-leaved evergreens is a relatively simple process, once the principles and aims are understood.

WHEN TO PRUNE TREES

Trees can be pruned any time of the year. Some trees bleed profusely when pruned in late winter. Among these are the sugar maple, birch, black walnut and flowering dogwood. The bleeding has no harmful effect although it may make a tree trunk unsightly. For this reason bleeder trees are usually pruned in the summer and fall.

Mountain ash, hawthorn, pear and apple, all susceptible to fire blight, should be pruned only in dry weather.

Summer pruning makes for compact growth. Where growing space is limited, judicious heading back of trees during the summer is often desirable. Thus, trees can be kept relatively low in height and small in crown. Summer pruning also makes it easier to see what the final results of pruning will be.

During the winter an experienced tree man can distinguish between dead wood and live by formation and condition of the buds. Winter pruning is often desirable because there is no interfering foliage and the operator can see precisely which limb to remove, which to leave. During the dormant season, also, there is no injury to garden plantings from falling limbs.

PRUNING TREES

How to preserve the health and beauty of a tree by pruning

F. A. Bartlett

PRUNING a tree is a natural and necessary process. It involves the removal of dead, diseased, superfluous and interfering branches with due regard for the future growth and health of the tree.

It takes only a little observation to show why shade and ornamental trees require pruning.

Shade trees shade us; they also shade themselves. Ample light is necessary for the development of foliage. Branches and limbs compete for that light. When handicapped by insufficient light, they become weakened and eventually die. The same competition occurs between trees planted too close to each other. A twig, branch or limb may die from many other causes as well.

Nature prunes woodland trees but in her own good time. A weakened branch dries out, decays and drops off. Sometimes Nature is ruthless in pruning. Violent wind, ice and snow storms break or tear off important parts of a tree. Ugly scars remain to invite invasion by wood rots or insects.

Reasons for Pruning

Man can do a much better job of pruning. He prunes for safety, and for the health and beauty of his tree. It is unsafe to allow a dead or dying branch to remain on a tree growing on a lawn, along a street, in a park or other public place.

Moreover, a dying branch is a threat to the health of a tree. It can become a point of buildup for borers and bark beetles, which hasten a tree's decline and death. A dead branch robs nearby limbs and the trunk of moisture. Wood rots, and fungi that take hold in a dying area of a tree progress inwardly to threaten more parts of the tree. Pruning is a valuable check on these disorders.

But pruning should not stop there. Guidance or corrective pruning is essential to young and middle-aged trees. The object is to produce a strong tree by avoiding V-crotches and the development of limbs so close together that later growth will result in interference either at the base or farther out.

A tree should be trained when young in the way it should grow. There should

Brooklyn Botanic Garden

This hydraulic lift makes it possible to get a man up into a tree easily to do pruning or lopping work with power tools be one vigorous leader, uniformly branched. Limbs should divide in the early years of growth into well-spaced subordinate branches. This makes for a strong framework. Pruning a tree early in life also reduces unsightly scars that occur when bold, old limbs are removed.

Removing the Wayward Branch

Pruning must continue all through a tree's life. Sugar maples tend to develop crowded and cross-over branches which have the same effect as girdling roots. The Norway maple and linden habitually send out a number of slender branches, some of which rub one another. Wayward branches can become hazardous ones.

Shade trees may develop heavy foliage during a growing season. This can cause a tree to grow out of bounds, casting excessively dense shade, interfering with nearby buildings or becoming a hazard should a violent storm shatter or blow it down. Thinning the crown then becomes desirable.

Lowering the Crown

Lowering the top of a tree by pruning will reduce the danger of damage by high winds. It is also beneficial in balancing the root system. The cause of a tree dying at the top may be that it is not getting sufficient nourishment in this part. By reducing the top of the tree Nature is given an assist.

Conversely, a tree can be "raised," a term used for the removal of branches near the ground. "Raising" lower limbs will admit more light and air beneath a tree. This is often necessary for the comfort of people walking beneath them. Foliage bowed low after a rain can become a nuisance over sidewalks or other traffic ways. The lower limbs of a shade tree along a sidewalk should be at least 10 feet above ground.

Shaping the Tree

Pruning when the saw is sharp has always been the best practice. The experienced man starts from the top of the tree and works down. It is easier to shape a tree by this method.

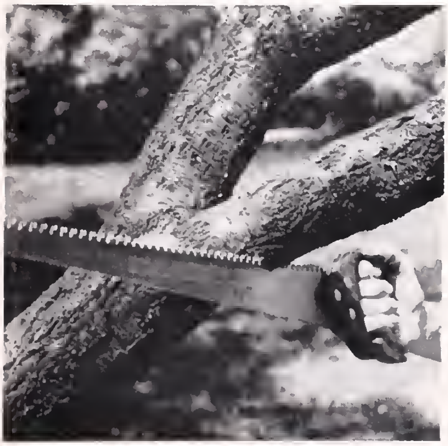
Shaping is most important. The characteristic growth of various trees must be kept in mind. An American elm after pruning must retain its vase-like shape, a white oak its spreading crown.

There is a vast difference between a person who knows how to prune and one who "butchers." Changing the form of a tree by barbering or pollarding or "dehorning" is deplorable. The crown

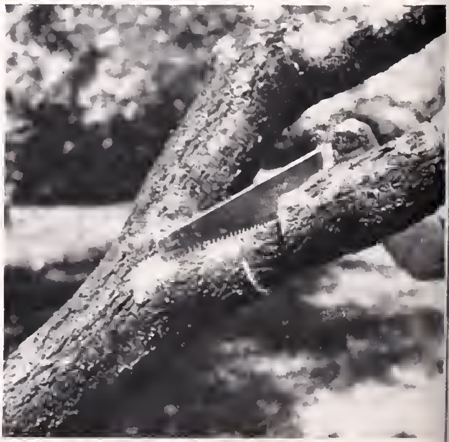
How to Cut Off a Tree Limb

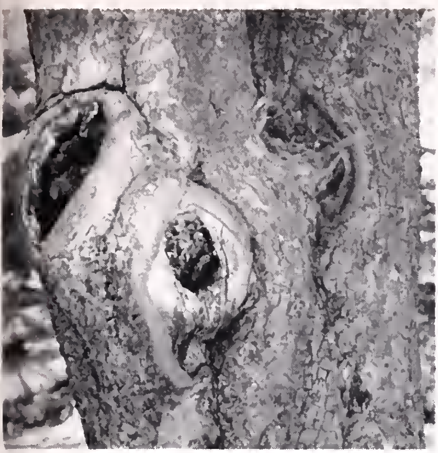
→

First, make an undercut several inches from crotch to prevent the bark tearing

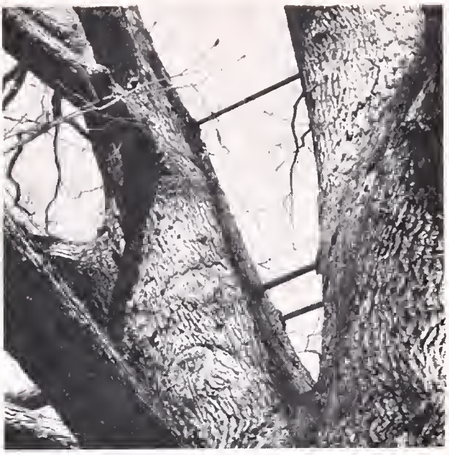


Make the second cut (on top) farther out on limb. After the branch falls, a stub is left





These wounds rotted before healing over because they were not re-painted each year



Wounds on this tree have healed perfectly. Through-bolts strengthen the crotch

should never be grotesque, even in winter when branches are bare. Continued pollarding results in overcrowding of sucker growth at the ends of stubs, and in the entrance of fungi and borers.

Thinning the Crown

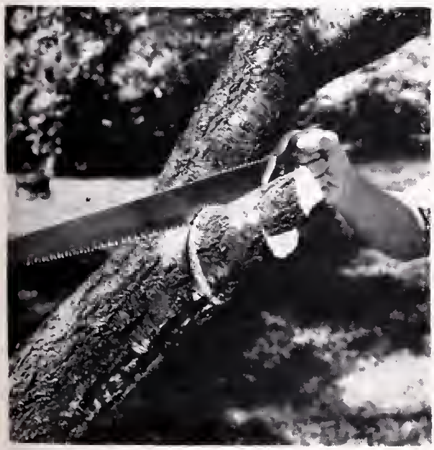
Thinning the crown must be done judiciously. Overpruning may open up a tree to intense sunlight, especially on the south and southwest sides. Thin-bark trees such as maples and beeches are very sensitive. Sun scald results; the bark dies.

In cases where severe pruning is called for, it may be advisable to do a little at a time over a period of several years.

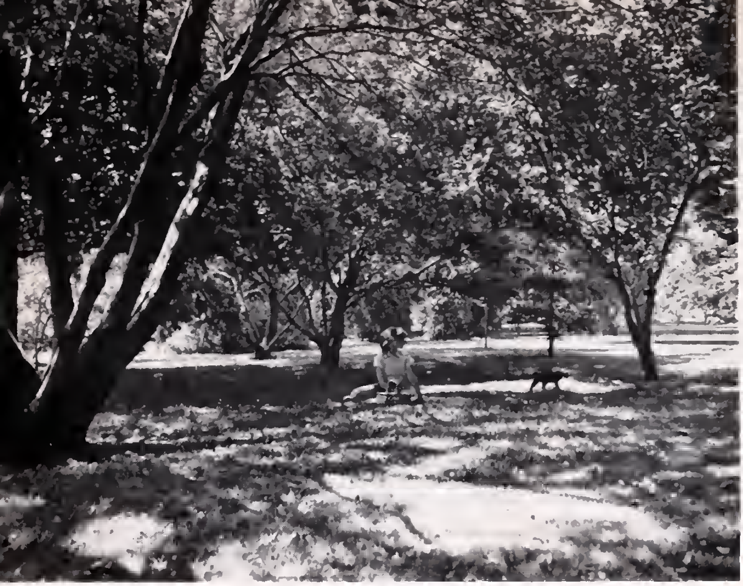
There is a right and a wrong way to prune a limb. The wrong way is to leave a stub, which may rot or break off to form an ugly knot hole or become an avenue for fungi and borers. Cut a branch close to the trunk swelling from which it originates. Keep the size of the cut to a practical minimum.

When removing a large heavy branch, make three cuts to avoid stripping the

Final cut is made close to the trunk along the line marked with white chalk



Smooth rough edges with a sharp knife, then treat cut area with tree paint



Pruning Trees to Form a Canopy Overhead

Trees in the maple collection at the Brooklyn Botanic Garden have had their lateral branches removed; the sprawling, upright trunks give a spreading foliage canopy above. *Acer opalus* is in left foreground

Mamay

bark of the trunk. The first should be an undercut half way through the limb about 6 to 12 inches from the trunk. The second cut is made on the upperside, several inches farther out on the limb or several inches closer to the trunk. This will permit the limb to fall without stripping the bark of the trunk. Now, the third cut is made flush with the trunk or branch to remove the stub.

Generally the inexperienced worker errs on the side of leaving too much rather than too little shoulder on the final cut. In removing a dead stub, the wound will heal more quickly if the pruner will cut a trifle into the collar of the callus, rather than merely sawing off the dead stub.

Cut to a Vigorous Bud

It may not always be possible to cut a branch flush to the trunk or larger limb. Then the cut should be made to a smaller branch or to a vigorous bud.

Slanting cuts should be made when removing parts that grow upward. This expedites healing (callus formation) and has less tendency to form a water-collecting pocket.

Use a pole saw to remove small and inaccessible limbs. Hand pruners or pole saws are advisable for pruning small branches and twigs. If the pruners bruise the bark on one side of the cut, exercise care to make certain the bruise is on the part removed. On very small wood within reach, an upward cut with a sharp knife will give the best results.

As a general rule after pruning a diseased tree, sterilize pruning tool, saw and other instruments in denatured alcohol.

Protecting the Wounds

The best success in pruning come when the branches are an inch or less i diameter. These cuts need not be painte over. If the tree is vigorous, the hea will be quick. All cuts 2 inches or mor in diameter should be painted with a antiseptic tree paint. This fills the pore of the exposed wood, checks evaporatio of sap and prevents the entrance of fungus spores and insects. Certain insect are attracted to fresh cuts of a tree.

Evergreens have a built-in protectio against attack by fungi and insects at th point of pruning cuts. This is the exudate of resins. Nevertheless, a daub o tree paint over the pruning cut of a pin is desirable. Otherwise the exuding resins drip down the tree, turn white i color and become unsightly.

After a pruning job has been finishe stand off and ask yourself whether th tree looks as though no limbs had bee

High-trimmed Trunks

All the lower limbs in this natural stand of trees were purposely pruned off to improve air circulation around this summer camp and open up the view

Clarence E. Lewis

removed at all. The proof of good pruning is the complete absence of any conspicuous evidence of the pruning work. If the finished work measures up to that, you have mastered the art of pruning.

But the effects of pruning come later. Pruning the top invigorates the branches that remain. Removal of the superfluous buds increases the vigor in those left on the tree. Pruning away terminal buds induces a thickening of the branch system. Severe pruning of the crown has a definite effect on the root system.

A tree weakened by drought, or whose roots have been injured by construction or fill or winter cold should have its crown balanced with its root system. Pruning can establish that balance. A tree with a small head doesn't need big feet. But a tree with a big crown and a root system suddenly abbreviated by injury will be in trouble unless pruning establishes the proper balance.

A Reason for Every Cut

For every pruning cut there must be a reason. It may be to make a tree more structurally sound, to remove weak and dead branches. It may be for sanitation, to destroy fungi and insects that are weakening the tree. It may be to correct growing faults, to eliminate the wayward, the interfering, the interlacing branches. It may be to promote symmetry, to keep it within bounds. It may be to thin the top so sunlight will filter down or winds pass through the foliage more easily, thereby reducing hazard of breakage or loss when angry storms strike. Or it may be to balance top and root.

For whatever reason, if the pruning is skillfully and judiciously done it will promote tree health and beauty.

Singer

The pole saw is a useful tool for pruning up to 10 to 12 feet from the ground

METHODS OF ROOT-PRUNING

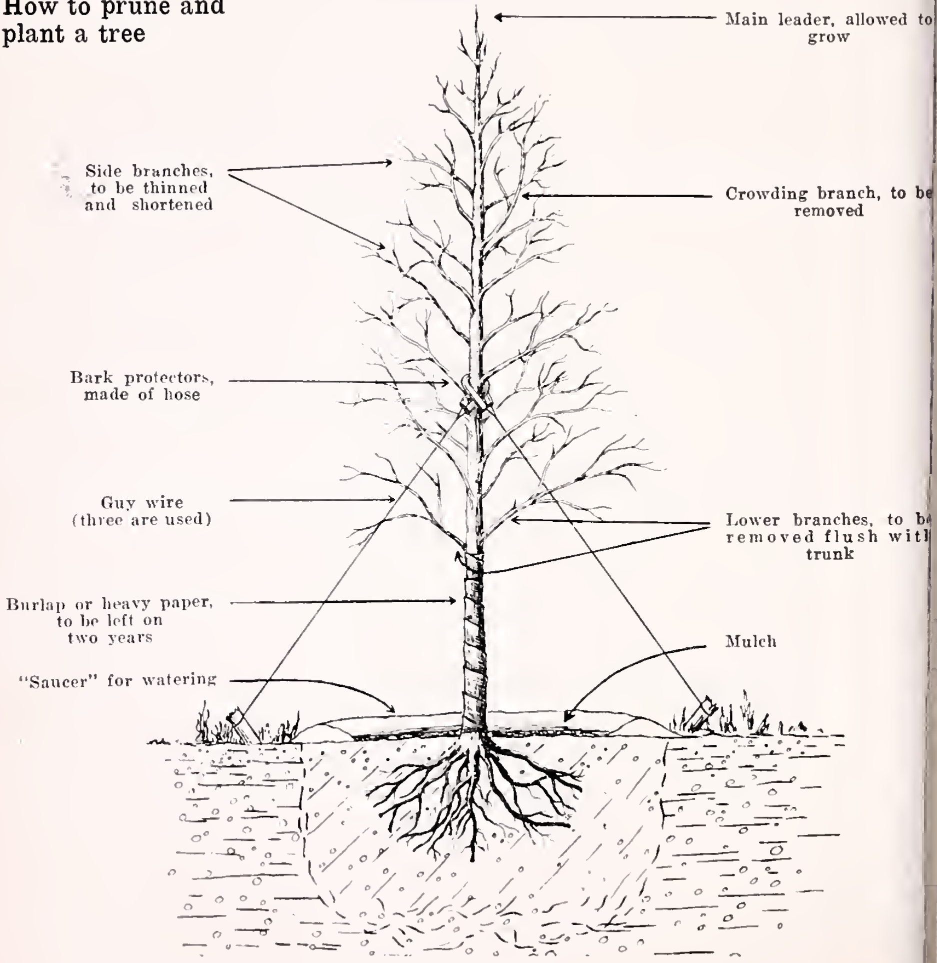
When opportunity permits, it is desirable to prepare certain types of wildling trees and shrubs for transplanting by root-pruning them a year or two ahead of the actual moving. Such a practice develops fibrous roots close to the base of a sparsely rooted plant and minimizes shock and root loss at the time of moving.

Plants which grow in the open and have a normal, vigorous root system with an ample supply of well-distributed fibrous roots rarely require this attention, but root-pruning frequently is beneficial for plants which have only a few long roots, with the majority of the feeding roots at the ends. In fact, without root-pruning it may be impossible to retain enough roots to enable the plant to recover from root loss.

Root-pruning is best done at least one full growing season in advance of the moving operation. Early spring is considered the best time because roots generally make their best growth during this season.

On small trees and shrubs, root-pruning may be done by cutting the lateral

How to prune and plant a tree


Main leader, allowed to grow
Side branches, to be thinned and shortened
Crowding branch, to be removed
Bark protectors, made of hose
Guy wire (three are used)
Lower branches, to b removed flush wit trunk
Burlap or heavy paper, to be left on two years
Mulch
"Saucer" for watering

roots with a sharp spade in a circle around the stem. The diameter of this circle will vary, of course, with the size of the plant, its rooting habit, type of soil, and the size of the earth ball to be moved with the plant. Judgment needs to be used in each case, but, in general, if the circle is cut so that one inch of stem diameter equals 10 inches of circle diameter, the results usually will be satisfactory.

On larger shrubs and trees, it is necessary to dig a trench all around the plant. The same rule of thumb given above is followed in locating the inner wall of the trench, which should extend to the depth of the root system. None of the bottom roots are cut at this time. As roots are exposed, they should be cut cleanly with root-pruners or some other sharp tool.

Paint cut ends with a pruning or tree paint. After the trench is dug, it should be backfilled with a mixture of good topsoil and, if available, granulated peat moss, well-rotted manure, or compost. Fertilization by the crowbar method within the root ball is highly desirable to induce fibrous root growth in this area. If rain is plentiful, watering may be unnecessary, but during dry weather, especially in spring and early summer, the ball and trench should be watered thoroughly at 10-day intervals.

If transplanting can be anticipated far enough in advance, and particularly if the species is difficult to transplant, such as oak and magnolia, some authorities advise extending root-pruning over a period of two years, pruning half the root system the first year, half the second, and doing the transplanting the third year.

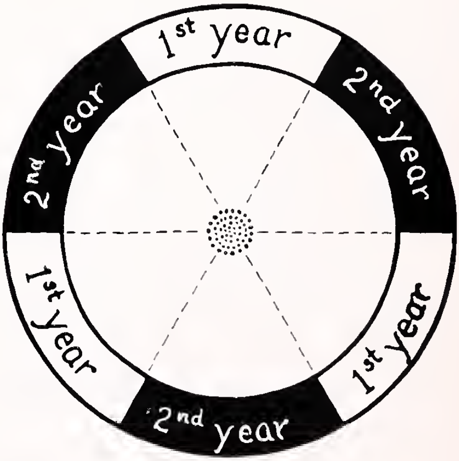
Brooklyn Botanic Garden

Wild flowering dogwood (left) was root-pruned one year before digging (note thick root system). Tree at right had no root pruning. It died after planting

Mulford recommends that this type of root-pruning be done by laying off the proposed trench into six equal segments and digging alternate segments in successive years, and backfilling as mentioned previously.

In order to compensate for the lost roots prune the crown at the same time the roots are pruned. The degree of top-pruning should correspond to the amount of roots cut.—Condensed from Transplanting Trees and Other Woody Plants, Tree Preservation Bulletin No. 1. National Park Service, Washington, D. C.

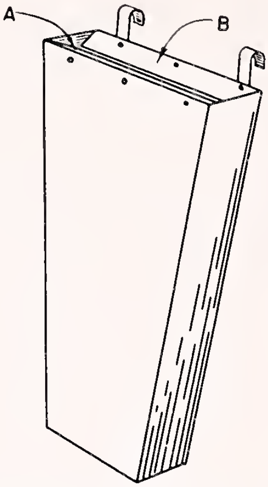
Plan for trenching a large tree to prune the roots over a two-year period



PRUNING DISEASED TREES

It is sometimes desirable to prune a tree which is infected with a virulent disease such as maple wilt or fire blight of apple and pear trees in order to arrest the spread of the disease or for general sanitation. Under such conditions, great care should be exercised so that the pruning will not actually spread the disease instead of retarding it. Saws and pruners used in this work should be thoroughly dipped in a solution of bichloride of mercury or alcohol between each cut to kill any infection which might be carried on the tool.

A metal sheath (see figure) slung from the belt and filled with a disinfecting solution will be found useful for this purpose. In the figure, A and B are rubber flaps or squeegees to remove excess disinfectant from the saw as it is being withdrawn. It is evident, of course, that sanitation pruning should be done far enough back from infected branches so as to cut through non-infected parts of limbs. Wood from such pruning should be burned as soon as possible and as close to the site as convenient so as to minimize the danger of spreading the disease. Even gloves may need sterilizing, after they're used in handling prunings, before resuming work on the next tree.—from Shade Tree Pruning. Tree Preservation Bulletin No. 4. National Park Service, Washington, D. C.



Metal tank, slung from belt, holds solution for disinfecting pruning tools

NOTE ON REJUVENATING GRAFTED PLANTS

In order to develop such interesting plants as the Schwedler Norway maple Koster blue spruce, purple-leaved plum, Japanese maples, and many other forms, th nurseryman has had to graft the desired form on the root of a different plant—on that is closely enough related and particularly vigorous. This practice does not necessarily make these plants less valuable; but the plants do require slightly different treatment in pruning.

In cutting back old plants of these grafted forms, it is dangerous to be too severe If too much of the top is cut out at one time, the root (which was chosen because i produced vigorous growth) will send up branches of its own kind. If a grafted lila is cut back too severely, the privet root is likely to send up new growth—of privet, o course, not lilac. If a purple-leaved plum is cut back too much, the root will send u branches with green leaves.

Therefore, if it is necessary to revitalize a grafted plant, the renewal prunin should be done in stages. No more than a fourth of the old growth should be cut ou at the ground level at any one pruning. Another fourth of the old growth may b taken out only after the young growth (which follows the pruning) has reached abou a third of its mature size. This slow method of revitalizing does not upset the important balance between roots and tops.

THE ART OF PRUNING HEDGES

R. W. Oliver

OVER a period of 70 years, 169 kinds of woody plants have been grown and evaluated as clipped hedges at the Central Experimental Farm at Ottawa. The present collection of 60 hedges contains nine planted over 60 years ago. Of these, Canada hemlock *(Tsuga canadensis)* is the only one of the original planting still in excellent condition, a solid green from the ground to its 7-foot peak.

Our hedge maintenance methods have varied, over the decades, with increasing knowledge of plant hardiness in our climate and as the changing labor situation has forced us to adopt new methods. Our present system might not prove satisfactory in the longer growing season of more southern latitudes but it suits our conditions.

We have never used such devices as stakes and lines, sometimes advocated as a guide to trimming a hedge in a straight line. As our old Scottish custodian of the hedge shears would have said, "Fer why wud a fella be treepin' ower they things. A'ye need is a stiddy han' an' a str-raight ee." From 1918 to 1946, Bob manicured our hedges, frequently, to a razor edge. He worked alone and took pride in perfection.

Now that power hedge trimmers have been substituted for hand shears plied with a degree of personal devotion, the same state of perfection has never been reached, though man hours required for hedge trimming, of course, have been greatly reduced.

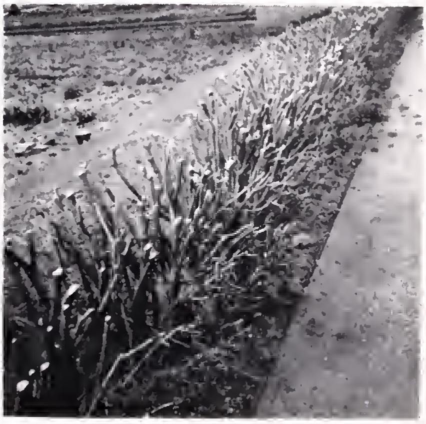
The effect that one wishes to create with a hedge determines the tool that should be used in trimming it, as well as the selection of the species to be planted. Hedge shears, if properly used, whether driven by hand or electricity, leave a flat, hard surface which is desirable where one wants to create a barrier between two areas, or lend emphasis to formality. If the aim in a flowering hedge, or even a clipped one, is for a less rigid shape and softer texture — a suitable background for a more informal situation — then a knife or hand pruning shears will be found more suitable. In the latter case, trimming consists simply of cutting off individual shoots which are growing too far out of line, so as to create a soft effect.

A knife or pruning shears is also more suitable to use on large-foliaged, or long-needled hedge plants, such as Hungarian lilac *(Syringa josikaea)* or red pine *(Pinus resinosa)*, because hedge shears leave slashed foliage or needles to disfigure the appearance.

An unwise selection of hedge plants leads to most failures. "I want a good, fast-growing, cheap hedge" is the commonest approach to the problem, and this results in disappointment. Chinese elm (*Ulmus parvifolia*) and multiflora rose (*Rosa multiflora*) are the outstanding examples of hedge plants in this class. They require such frequent trimming that they usually look neglected.

When a privet hedge gets too big or becomes misshapen, prune it severely, as illustrated, in spring. Within a year or two it will make a solid low hedge

Everett



Hedges have rounded tops in the Ottawa hedge trials to protect them from snow injury

For most situations, the best hedge materials are fairly small-leaved, short-noded species which have the ability to put forth lateral shoots when the ends of terminal shoots have been snipped off.

Certain species, when grown from seed, have reasonable uniformity, so that enough similar plants to fill a hedge can be chosen from a batch of seedlings. Where there is lack of uniformity in habit of growth or color of foliage among seedling-grown plants, however, it is better to use plants grown from cuttings of the same clone.

We prefer to start our deciduous hedges with two-year seedlings that have been pinched at the end of the first season's growth to make them branch near the ground. When the two-year-olds are planted in their permanent position, they are cut back 4 to 6 inches above ground level. In late June, they are trimmed lightly to shape them and again in September, leaving not more than 4 to 6 inches of new growth between each clipping, even in vigorous species. If two or three laterals on each stem are formed as a result of each trimming, a good bushy hedge will result. By this system, even the rank growing Chinese elm will make a fair 4- to 5-foot hedge in three years, while the alpine currant *(Ribes alpinum)* will make an excellent 2- to 3-foot one. When hedges have become established, they are only permitted to grow about 2 inches a year, both in height and width.

Labor conditions have forced us to adjust our times of trimming to the minimum. We do not use the shears until the last week in June, by which date the majority of deciduous plants have made most of their season's growth. It is true that for the last two weeks some of them look quite ragged, but this cannot be helped.

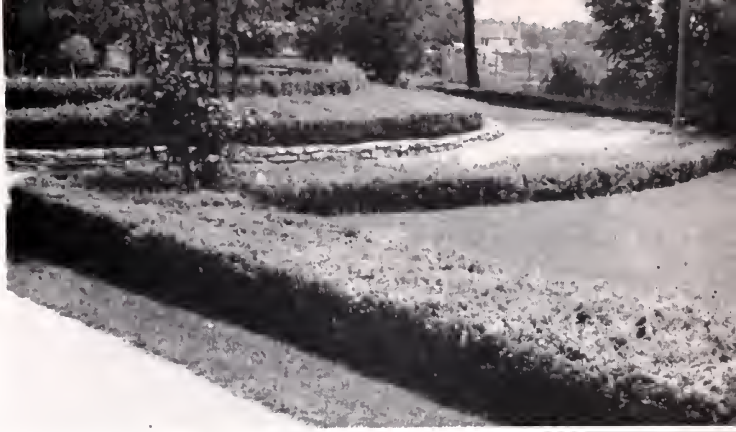
Stopping the terminal growth at this time does encourage vigorous species to put out laterals from early-formed buds, which makes it necessary to trim again in late August or early September. It is very rare that laterals are put out after this second trimming, except in privet (ligustrum) and prinsepia which do not seem to know when to stop growth in our moist fall, and suffer in consequence during the following winter.

Conifers require more individual treatment. Hemlock and spruce can be treated similarly to the deciduous hedges by trimming with shears at the end of June. Chamaecyparis, juniperus, thuja and taxus start growth later with us and are usually trimmed a little later. In fact, old established hedges of these can be left until late August, if one wishes to trim only once a season. This, of course, means more roughness in appearance through July and August.

Pine hedges look better when trimmed with a knife or pruning shears, cutting back the new terminal buds late in June to force the development of lateral buds for next year. This produces bushy growth. Old pine hedges with a close-woven top can be trimmed very lightly with shears.

Ribbon Hedge of Barberry

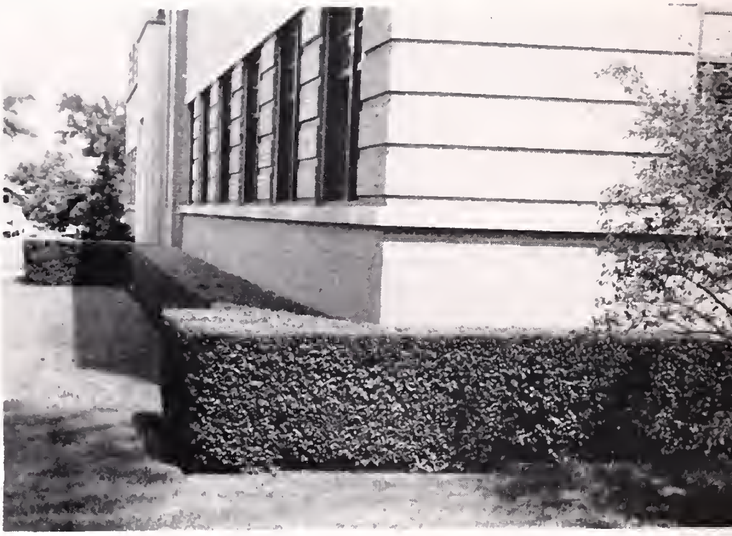
Broad low hedge (made by setting plants several rows wide) dramatizes the boundaries of lawn areas and walks. In northern areas, strong wiry plants, such as *Berberis thunbergi*, are not easily injured by weight of snow



Buttress Hedges

Square-clipped hedge planted close to wall emphasizes the strong architectural lines of a building. Warning: flat-topped hedges suffer where snows are heavy

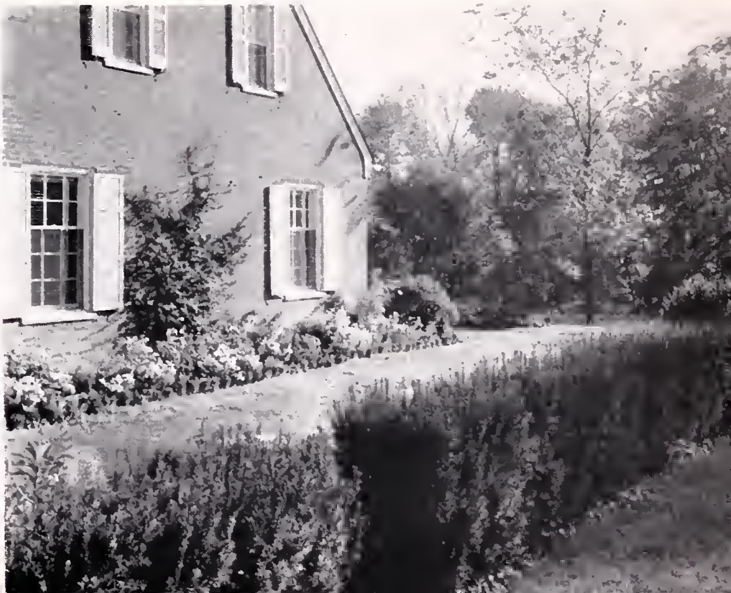
Author photos



Boundary Hedges

Hicks yew makes a rich, dark green, upright hedge, but requires frequent clipping to keep it neat. This hedge needs clipping now

McFarland



The danger with all conifers is trimming too heavily. As new growth comes from buds at the tips of last year's growth, this season's growth can only be reduced by one-half or two-thirds its length. Cutting back beyond the base of the current season's growth will leave a bare spot that will take a long time to fill from growths at the sides.

It is possible to renovate an old deciduous hedge that has become too tall, open at the bottom, or which has developed holes on the side, by cutting it back very severely in early spring. New shoots will develop from old wood or in some cases new shoots will come up from the roots. Privet hedges, which often kill to the snowline at Ottawa, are excellent examples of this. This cannot be done with conifers, however. It is much wiser to replace a neglected conifer hedge with a new one than try to renovate it.

The shape to which hedges are trimmed in Ottawa is important. A rounded or pointed top is much preferred since a flat-topped hedge is more easily broken down by the weight of ice and snow. Coniferous hedges are particularly subject to this damage.

There is another important reason for these shapes. By having the hedge wider at the ground than at the top, more light reaches the lower foliage, so that it remains healthy. This applies particularly to tall hedges.

Modern architecture is presenting Canadian gardeners with new problems in shaping hedges. Low square-clipped hedges, with thicker and higher buttresses, are admirably suited to complement the architectural lines of flat-topped houses. Yet, they are just as out of place in our climate as the flat roof.

Broad, flat-topped "ribbon" hedges are frequently used now to discourage pedestrian traffic across lawn areas, and still leave open views. These hedges must be at least 3 feet wide to be effective, and require three rows of plants. Alpine currant or privet are most commonly used, though Thunberg's barberry is a more effective barrier.

Whether or not these innovations will be retained, will depend upon the lengths to which people will go to keep up with fashion in the face of northern climatic conditions.

Hedge pruning at Schoenbrunnen Castle in Vienna, Austria, requires special scaffold equipped with horizontal and vertical pruning guides. Rods at top set upper level; plumb bobs give vertical plane

Gantner

Hedge trimming, backyard style. It is possible to do a neat job with hand shears and without guide lines. Hedges taller than this one are difficult to care for. This height is enough to provide privacy

Roche

Singer

Not all clipped hedges and edgings are of hardy plants. The informal, staked fuchsias (center) are here surrounded by low hedges of gray santolina and teucrium

GUIDE TO SELECTING HEDGE PLANTS*

How to cut maintenance time by using easy-to-care-for trees, shrubs and evergreens

Walter C. Smith

THE hedge trials at the Morton Arboretum at Lisle, Ill. have yielded valuable information, among other things, on the average trimming requirements of more than 150 kinds of deciduous and evergreen hedge plants. When it is known that during a growing season, a 100-foot, medium size, formal hedge may require up to ten hours of trimming time, selection of the kinds of hedge plants one uses becomes important from the standpoint of maintenance.

The number of times a hedge must be trimmed each season to present the best appearance is not always important in itself. Some 100-foot formal hedges may be trimmed with an electric hedge shear in half an hour. Although they may require several clippings each season, the total time spent may be less than that required by a hedge needing only one or two clippings, but which is composed of plants much more difficult to trim.

Some fast-growing privets require frequent trimming to keep them perfectly groomed. The popularity of privet is based more on initial low cost than other factors. Where hedging is to be very extensive, privet is almost always chosen.

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*The plants listed in this article are especially suited to the Midwest area where soil and climate approximate those of the Chicago region.

Consequently, privets now carry the stigma of commonness and many lists of recommended hedge plants omit them.

In the following lists, plants are grouped according to the degree of maintenance required — light, moderate or heavy, based on information gathered from the Morton Arboretum hedge trials. While it is impossible to indicate the exact time required, for several reasons, the groupings do take into consideration the average number of clippings each season as well as the average time required for a single clipping needed to keep the hedge perfectly groomed.

Suitability of the plants for a particular size of hedge, and also the leaf size are noted. Hedge sizes are: low (up to 2 feet); medium (2 to 5 feet); and tall (over 5 feet). Foliage is indicated as fine (leaves up to ¾ in. wide or 1½ in. long), medium (between ¾ in. wide or 1½ in. long and 1¼ in. wide or 2 in. long), and coarse (larger than 2 in.).

Not all the plants in these lists are the best ones to use for formal hedges. Those marked with a single asterisk (*) have received a rating of "excellent." Where a double asterisk (**) appears, the plant is one of 12 "superior" for clipped hedges in the Morton Arboretum trials. Others which may prove perfectly satisfactory, under certain conditions, are American holly *(Ilex opaca),* European hornbeam *(Carpinus betulus),* Canadian hemlock *(Tsuga canadensis),* Hatfield yew *(Taxus media hatfieldi),* Hicks yew *(Taxus media hicksi),* Pfitzer juniper *(Juniperus chinensis pfitzeriana),* nannyberry *(Viburnum lentago)* and shingle oak.

Light Maintenance Requirements

Plants listed in this group normally require the least amount of total trimming time during the season. All need one to four clippings which can be done with ease.

DECIDUOUS

Scientific Name	Common Name	Hedge Size	Foliage
Acer campestre,	**Hedge Maple**	medium	coarse
Acanthopanax sieboldianus,	**Five-leaf Aralia**	medium	fine
Amorpha nana,	**Dwarf Indigo**	low	fine
Artemisia nana,	**Dwarf Artemisia**	low	fine
Berberis koreana,	**Korean Barberry**	medium	medium
Berberis mentorensis,	**Mentor Barberry**	medium	fine
Berberis thunbergi erecta,	**Truehedge Columnberry**	low, medium	fine
Berberis thunbergi minor,	**Box Barberry**	low	fine
Carpinus betulus,	**European Hornbeam**	tall	medium
Carpinus caroliniana,	**American Hornbeam**	tall	medium
**Euonymus alatus compactus,*	**Dwarf Winged Euonymus**	medium	medium
Forsythia intermedia nana,	**Dwarf Border Forsythia**	low	medium
Ligustrum obtusifolium erecta,	**Border Privet**	medium	fine
Lonicera fragrantissima,	**Winter Honeysuckle**	medium	medium
Prunus cistena,	**Purpleleaf Sand Cherry**	medium	medium
Prunus maacki,	**Amur Chokecherry**	tall	medium
Rhamnus frangula,	**Glossy Buckthorn**	medium, tall	medium
***Ribes alpinum,*	**Alpine Currant** (only staminate form immune to white pine blister rust should be used.)	low, medium	fine
Rosa rubrifolia,	**Redleaf Rose**	medium	fine
Salix incana,	**Rosemary Willow**	medium	fine
Salix purpurea nana,	**Dwarf Purple Osier**	low	fine
Spiraea bumalda 'Anthony Waterer,'	**Anthony Waterer Spirea**	low	fine
Spiraea japonica ovalifolia,	**Ovalleaf Japanese Spirea**	low	fine
Symphoricarpos chenaulti,	**Chenault Coralberry**	low	fine
Viburnum lentago,	**Nannyberry**	tall	coarse
Viburnum opulus,	**European Cranberry-bush**	medium	coarse
Viburnum opulus nanum,	**Dwarf European Cranberry-bush**	low	medium

EVERGREEN

***Buxus microphylla koreana,*	**Korean Box**	low	fine
Chamaecyparis thyoides,	**White-cedar**	medium	fine
**Euonymus fortunei carrierei,*	**Glossy Wintercreeper**	low	medium
***Euonymus fortunei coloratus,*	**Purpleleaf Wintercreeper**	low	coarse
**Euonymus fortunei vegetus,*	**Bigleaf Wintercreeper** or **Evergreen Bittersweet**	low	coarse
Taxus cuspidata capitata,	**Japanese Yew**	tall	fine
Taxus media hatfieldi,	**Hatfield Yew**	medium	fine
Taxus media hicksi,	**Hicks Yew**	medium	fine
Thuja occidentalis,	**American Arbor-vitae**	medium, tall	coarse
Tsuga canadensis,	**Common** or **Canadian Hemlock**	medium, tall	fine

Moderate Maintenance Requirements

This group needs a moderate amount of trimming time. Most require four to seven trimmings. The few that need only two or three clippings are more difficult to trim.

DECIDUOUS

Scientific Name	**Common Name**	**Hedge Size**	**Foliage**
**Acer ginnala,*	**Amur Maple**	medium, tall	medium
Amorpha fruticosa,	**False-indigo**	medium	fine
Andrachne colchica,	**Andrachne**	low	fine
Berberis thunbergi atropurpurea,	**Redleaf Japanese Barberry**	low, medium	fine
Caragana pygmaea,	**Pygmy Pea-tree**	low, medium	fine
**Chaenomeles lagenaria,*	**Flowering Quince**	medium	medium
***Cornus mas,*	**Cornelian-cherry**	medium, tall	medium
Cornus stolonifera kelseyi,	**Kelsey Dwarf Red Osier Dogwood**	low	coarse
**Cotoneaster acutifolia,*	**Peking Cotoneaster**	medium, tall	fine
**Cotoneaster nitens,*	**Pinkblush Cotoneaster**	medium	fine
***Crataegus phaenopyrum* (syn. *cordata*),	**Washington Hawthorn**	medium, tall	coarse
Elaeagnus angustifolia,	**Russian Olive**	tall	fine
***Euonymus alatus,*	**Winged Euonymus**	medium	medium
Forsythia intermedia,	**Border Forsythia**	medium	medium

Germander (*Teucrium chamaedrys*) makes a neat, low, clipped hedge or edging plant

White pine is an excellent evergreen hedge plant when it is kept closely clipped

Author photos

*_Ligustrum amurense_,	**Amur Privet**	medium	fine
Ligustrum ibolium,	**Ibolium Privet**	medium	fine
Ligustrum obtusifolium regelianum,	**Regel Privet**	medium	fine
Ligustrum sinense,	**Chinese Privet**	medium	medium
Ligustrum vulgare,	**Common or European Privet**	medium	fine
Lonicera maacki,	**Amur Honeysuckle**	tall	medium
Lonicera tatarica,	**Tatarian Honeysuckle**	tall	medium
Malus sargenti,	**Sargent Crab-apple**	medium	medium
Malus transitoria,	**Tibetan Crab-apple**	medium, tall	fine
Morus alba tatarica,	**Russian Mulberry**	tall	medium
Prinsepia uniflora,	**Hedge Prinsepia**	medium	fine
Rhamnus davurica,	**Dahurian Buckthorn**	medium	medium
**_Rhamnus davurica nipponica_,	**Nippon Buckthorn**	medium	fine
*_Rhamnus infectoria_,	**Avignon-berry**	medium	medium
Rhodotypos tetrapetala,	**Jetbead**	medium	coarse
Rosa primula,	**Primrose Rose**	medium	fine
*_Spiraea multiflora_ x _arguta_,	**Snowgarland Spirea**	low, medium	fine
Symphoricarpos albus ovatus,	**Snowberry**	medium	fine
*_Syringa vulgaris_,	**Common Lilac**	medium, tall	coarse
Ulmus pumila,	**Siberian Elm**	medium, tall	fine
*_Viburnum lantana_,	**Wayfaring Tree**	medium, tall	coarse
EVERGREEN			
Ilex opaca,	**American Holly**	medium, tall	medium
Juniperus chinensis pfitzeriana,	**Pfitzer's Juniper**	tall	fine
Pseudotsuga taxifolia,	**Douglas Fir**	tall	fine
(only one or two trimmings needed)			

Heavy Maintenance Requirements

This group of plants requires considerable trimming time during the season. Most need from four to seven trimmings and take the most time to clip.

DECIDUOUS

Scientific Name	Common Name	Hedge Size	Foliage
Berberis thunbergi,	**Japanese Barberry**	medium	fine
**_Chaenomeles lagenaria umbilicata_,	**Rose Pink Flowering Quince**	medium	coarse

A pole rotary power saw is excellent for grooming tall, sheared plants

A hedge comb, made of light plywood, is useful for removing clippings easily

Author photos

McFarland

Of all evergreen hedges Canada hemlock is probably the best and easiest to care for

Cotoneaster lucida*, **Hedge Cotoneaster	medium, tall	fine
Fontanesia fortunei, **Glossy Fontanesia**	medium	fine
Ilex verticillata, **Black Alder or Winterberry**	medium	medium
Kolkwitzia amabilis, **Beauty-bush**	medium	medium
Larix decidua*, **European Larch (requires two lengthy clippings)	medium, tall	fine
Lonicera bella albida, **Belle Honeysuckle**	medium	fine
***Lonicera* Clavey's Dwarf, **Clavey's Dwarf Honeysuckle**	medium	fine
Maclura pomifera, **Osage-orange**	tall	medium
Physocarpus intermedius parvifolius*, **Dwarf Illinois Ninebark	medium	fine
Physocarpus monogynus*, **Mountain Ninebark	low, medium	fine
Quercus imbricaria, **Shingle Oak**	tall	coarse
Rhamnus cathartica, **Common Buckthorn**	medium, tall	medium
Rhus aromatica, **Fragrant Sumac**	medium	medium
Rosa hugonis*, **Father Hugo Rose	medium	fine
Rosa multiflora, **Japanese Rose**	medium	fine
Salix matsudana tortuosa, **Contorted Hankow Willow**	medium	medium
Salix pentandra, **Bay or Laurel Willow**	tall	medium
***Syringa chinensis*, **Chinese Lilac**	medium, tall	fine
Viburnum dentatum, **Arrow-wood**	medium	medium
EVERGREEN		
***Pinus strobus*, **White Pine** (requires one time-consuming careful trimming)	tall	coarse
***Taxus cuspidata*, **Japanese Yew** (requires two careful trimmings)	medium	fine

PROPER PRUNING OF NARROW-LEAVED EVERGREENS

G. William Longenecker

THE initial investment that so many people make in landscape plantings of evergreens is often lost through neglect. Part of this is the result of poor selection of varieties. More often, however, it's through lack of knowledge of how to prune the different kinds of evergreens usually planted around homes, and the timely use of this information. Stark evidence of this fact are the thousands of examples to be seen everywhere, of completely overgrown, poorly pruned landscape plantings.

Japanese yews are among the most expensive of all evergreens used for foundation plantings. They usually come from the nursery as well-shaped plants; but if they are left to grow without pruning, in a few years they become ragged, open-branched, overgrown and unattractive.

Pfitzer juniper is a vigorous grower and, unless pruned, it may soon become too wide for its allotted space. Upright junipers and arbor-vitaes frequently become too tall and open-branched if left to themselves. One does not have to go very far in any neighborhood to see examples of such neglect.

Small-leaved evergreens, such as arbor-

Shearing these evergreens to such an unnatural shape serves no good purpose, and is a poor horticultural practice

Gantner

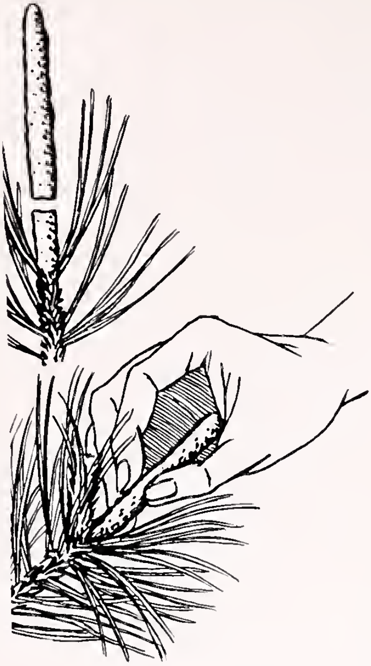
Gottscho-Schleisner

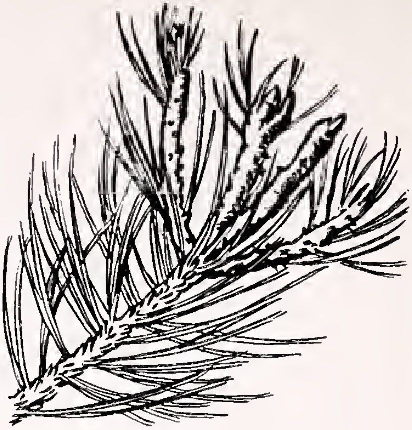
Unless the evergreens in this garden are pruned regularly, they will become overgrown. Prune selectively, rather than shearing as on the opposite page

vitaes, yews and junipers, usually need occasional pruning to preserve their shape and size. These small-leaved types can be pruned back at the ends of their branches without any danger of injury. They form new buds that grow quickly, and at so many places that the location of existing dormant buds may be disregarded. The best time to prune these evergreens is when the new foliage is soft. Pruning off the soft ends of yew branches tends to thicken-up the plant and prevent it from becoming too tall or wide (depending on how the cutting is done).

Tall-growing evergreens, such as the American arbor-vitae, red cedar and their varieties, may be pruned with a sharp knife in late spring or early summer. Sweeping motions with the blade of the knife up along the edge of the tree can remove the ends of the new growth that extends beyond the normal outline of the tree. This stimulates branching and the production of new foliage, so the tree becomes dense and well filled out. Too frequent pruning of this type may give the tree a sheared, unnatural look which is not in keeping with the average home. Neglect, on the other hand, may necessitate the removal of the tree or pruning it so drastically that it will be a long time before the tree is of much value.

Severe pruning or pruning large branches of evergreens usually exposes a considerable amount of old wood, which may be unsightly for some time. Fairly extensive pruning may be done, however, if the operations are restricted to the region of the green foliage. Cutting off the ends of twigs stimulates new





Nipping Evergreen Candles in Spring

If the candle-like new shoot tips of pine are snipped off in spring, while still young, numerous branches will form next growing season (see above). If the practice is continued in occasional years, trees will be densely foliaged.

Sketches by Eva Melady

HOW TO PRUNE A PAIR OF YEWS

Unpruned yews soon get so large that they obstruct traffic, get out of scale

Both plants have been pruned back rather severely, as evidenced by pile of clippings

side growth on the branches cut and makes the foliage grow thicker.

Wide-spreading evergreens, such as Pfitzer and Savin junipers, can be kept in bounds if some pruning is done every year or so. If carefully selected, long branches sometimes can be removed at the base of the plant. If there is a shorter branch directly above the long one that is cut, the upper branch usually droops so as to cover the scar and fill the gap.

Pruning for Compactness

Swiss mountain pine *(Pinus mugo)* needs frequent pruning if it is to be kept in compact form. This pruning is best done when the new candle-like shoots are fully elongated but still soft. This new growth should be shortened about two-thirds of the way back to the old growth with sharp pruning shears or knife; or, better yet, when it is in the crisp state, it can be broken off with the fingers — very easily and quite neatly.

Firs and spruces, as a rule, need very little pruning, but if trees tend to become too open they can be made to develop more foliage and thicker tops by pruning. These trees, however, have to be treated somewhat differently from other small-leaved types. They form side buds along their twigs. Pruning should be done in the late summer, fall or winter, when these side buds are present. The cutting should be done in such a way that some of the side buds are left to develop new growth.

Timely pruning has saved these yews from getting too big for corrective pruning

Clarence E. Lewis

Pine, fir, and spruce trees sometimes lose their central leaders as a result of mechanical injury, insects, or other causes. If a tree, thus damaged, is left alone, it may become wide-topped and unattractive because a number of buds just back of the injury compete with each other for dominance. If the strongest-growing bud or branch, or the one best located, is left and the others removed, the tree will soon form a good new top. Frequently, the selected branch can be trained into position quickly by tying it to a stout stick which is fastened to the top of the trunk and allowed to extend upwards enough to support the branch.

A little pruning of evergreens every year or two will prevent the necessity of a major operation at any one time. If evergreens are allowed to grow for several years without care, it may be difficult or impossible to bring them back to the desired size and shape and they will be worthless.

This spruce planted near the house can be restricted in width and height by following a selective annual tip-of-branch pruning program

McFarland

ROSE PRUNING

The how and why of pruning all types of roses

Everett A. Piester

ANYONE who finds that rose pruning presents a perplexing problem of why, when and where to cut should first of all realize that pruning is done fundamentally to tidy the appearance of the plants, to control their size, and to improve their health, growth habits and bloom.

Pruning methods vary according to the type of rose. The amount of pruning varies with the geographic location, the vigor of the plants and personal preferences.

North of the latitude of New York, the top parts of canes of bush roses, such as hybrid teas and floribundas, may be damaged by cold weather. This automatically determines the degree of spring pruning for there is no reason to hope that canes turned brown or bluish black will ever again become green and grow.

Frost-injured "wood" should be removed to the first green bud or to a point where the bark is really healthy and the pith not granular and brown, but firm.

Late winter or spring pruning, depending upon geographic location, should be done as early as settled spring weather permits removal of winter protective materials or when buds begin to expand. If delayed until the buds have fully expanded or real growth started, it will be difficult to avoid breaking off many buds or new branchlets, thereby reducing the growth and blooms.

Pruning Methods by Types

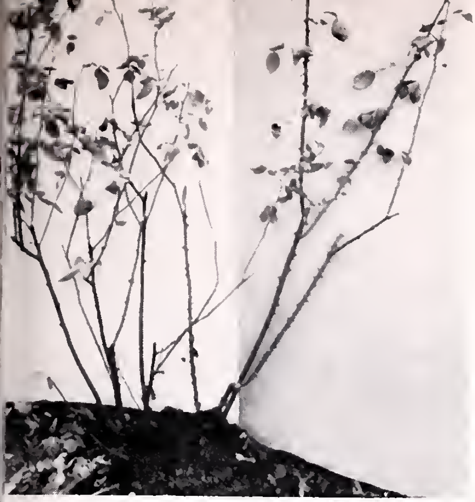
Climbing Roses. Climber is a term commonly used without distinction between slender-caned ramblers, like Dorothy Perkins, and the heavier caned, larger-flowered varieties such as Blaze and Hercules.

Ramblers on fences and walls may very well be left with no pruning except to cut back at any time canes that grow beyond desired limits and to remove dead canes and occasionally some of the older less productive ones.

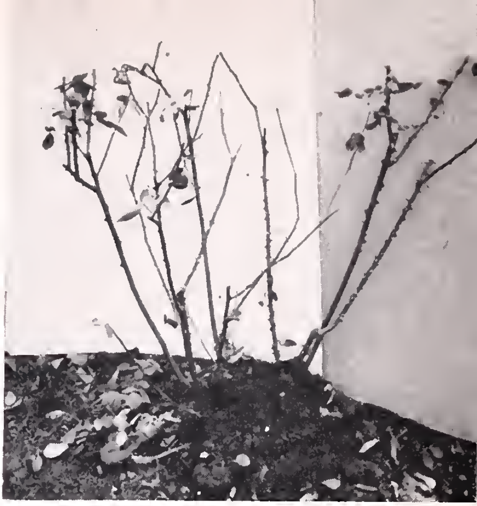
The finest and most blooms on ramblers are on canes that started from the bottom of the plant last year. Therefore, it is important to renew the plant by removing older canes. Some may be taken out soon after flowering when new growths are 4 to 6 feet long. It may be desirable to retain maximum volume of the plant

Roche

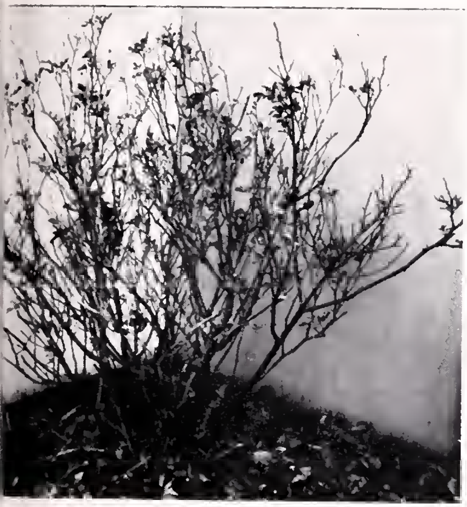
This is the last cut, with sharp shears, in pruning a hybrid tea in spring. Here, some of the already growing buds may be snapped off accidentally during pruning



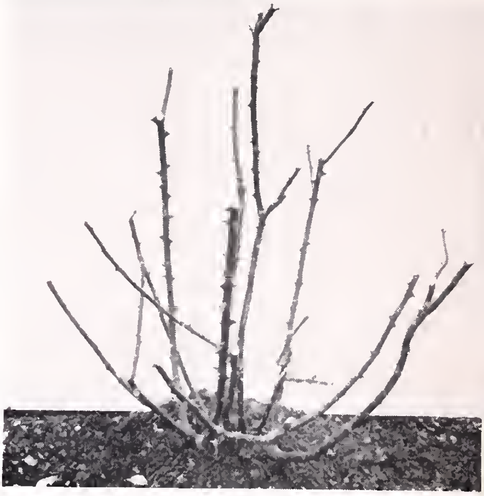
Hybrid teas which have made tall growth need fall pruning to prevent winter breakage →



Same plant, pruned, has thin growth removed to reduce snow, wind injury



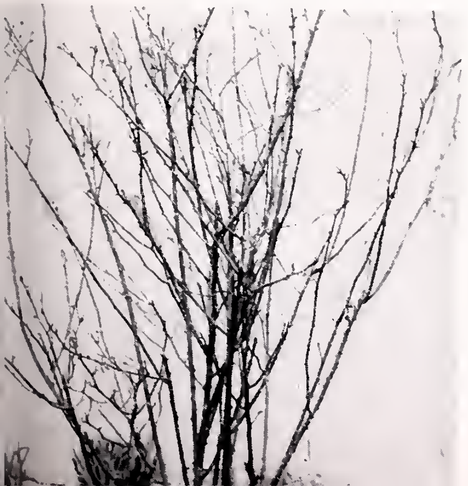
The polyantha, *above*, is full of fine twigs and old, overgrown stems. The shrub rose, *below*, needs top pruning and old cane removal, too, to get the best growth and blooms → →

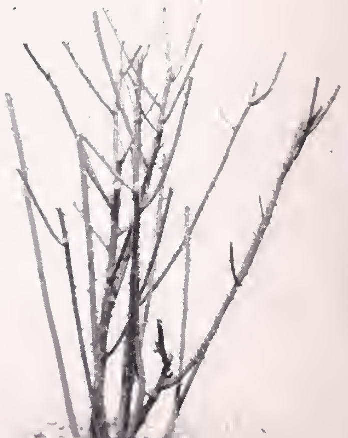


McFarland

Pruned polyantha, *above*, is now well-shaped. Only young wood remains. Shrub rose, *below*, is pruned high to keep it in shrub-like proportions

Roche





for the summer and so delay pruning until the end of fall. One may then take the entire plant from the supports, do a thorough cutting of old canes and select eight to ten of the best new ones for retraining on the support.

Large-flowered climbers having one or a few canes from near the bottom of the plant may be left with little or no spring pruning other than tidying the appearance by removing dead wood, spindly twigs and side shoots.

There will be times when one wishes to shape, train, thin or reduce the size of climbers or other roses. This may be done at any time. Pruning does not "hurt" or kill a rose bush *no matter when it is done.*

Climbing hybrid teas, such as climbing Crimson Glory and most other large-flowered climbers that tend to be ever-blooming or repeat blooming, will look best if the old blooms are cut off just above the first "eye" or bud in the axil of a leaf. This is usually the first leaf with five leaflets below the flower. However, if the branches of this spring's growth which bloomed are very long, it may be desirable to cut them back so that only two or three leaves remain. This will force new laterals to develop and give the desired recurrent growth.

Hybrid Teas. The most controversy over pruning is that of high versus low spring pruning of hybrid teas. In the north, where rose plants may freeze back to soil level, there is no choice but low pruning. However, where scattered plants do not freeze as much as others, one can leave more wood if it does not make the garden or border too irregular in height.

Where most plants go through the winter with little or no killing, the gardener must choose. With vigorous growers, like Diamond Jubilee, Peace, Sutter's Gold or Charlotte Armstrong, cutting out twigs and weaker canes will still leave four or more basal canes or strong branches of pencil size or greater. If these remaining canes are pruned back to 3 feet, the uppermost two to four buds of each will grow branches that will have their first flush of blooms at head height. When bloom stems are cut back after flowering to the second or third leaf, the next crop of blooms will be very high and the plants appear open and leggy. This can be avoided by cutting back to 2 feet or less, to establish lower levels of recurrent bloom. Pruning to one foot or less produces lower spreading or branching plants which never appear leggy or open. This would naturally suggest closer planting, say 19 to 22 inches. The taller, larger plants would be spaced 24 to 33 inches.

The largest and finest blooms are produced on new canes from the bottom of the plant or low down on last year's new canes. Therefore, for exhibition or especially fine cut flowers it is usually best to prune low. Taller plants have more branches and, therefore, a greater number of blooms.

One gardener I know prunes the outer row of plants low so their growth will shield the long canes of taller pruned ones in the center of the bed.

Varieties that are naturally lower may be pruned proportionally. Those that are not growing well or have weak canes may be forced to make new growth at ground level by close pruning.

Grandifloras. Queen Elizabeth and Buccaneer, and other large-flowered, cluster blooming varieties may be treated like hybrid teas or given almost no pruning except springtime removal of small twigs or laterals and the removal of old bloom sprays to the first five-leaflet leaf.

Floribundas are variable in habit and size of plant. Since volume of bloom is their objective, a minimum of pruning is called for except to force stronger canes by pruning weak plants to 3-inch stubs. After a few years, it may be desirable to severely cut back one-third to one-half of the canes to force new vigorous canes.

Polyanthas and Small Floribundas. Pruning of these types is purely a matter of preference because the amount of pruning, other than removal of twiggy branchlets, will not affect quantity or quality of flowers and but little affect plant size.

Hybrid Perpetuals are strong growers that need to have several canes of each plant cut back yearly to force new canes to grow from near the base. Otherwise treat as hybrid teas.

Old Roses and Rugosa Hybrids. The term "old rose" applies to any hardy shrubby variety which was popular prior to 1900, such as roses classed as moss, cabbage (centifolia), gallica, and others.

Aside from normal low pruning at planting time and removal of any dark wood that fails to grow by early summer, no pruning is necessary the year of planting. In fact, many growers prune them very little thereafter other than removing dead canes, spindly twigs and too-vigorous branches or canes.

For garden borders and foundation or shrub borders, renewal pruning is preferred. New growths from the base of the bush, whether the first year or thereafter, branch to bear flowers. These branch again with shorter flowering growths each year. After a few years several of these older, overgrown canes should be removed at ground level to encourage new canes and thus renew the bush.

If a new strong branch starts part way up an old cane, cut out the older wood above it and snip off the top when it is as tall as the rest of the bush to make it branch. This renewal pruning is done in summer right after flowering.

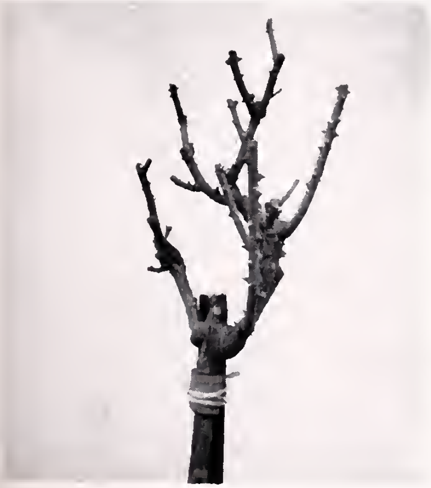
During winter or spring, cut back strong shoots from the base one-third to one-half to encourage lower branching the second year.

Hybrid rugosas are treated much the same as above. Do not expect old canes to sprout laterals when cut back. It is better to remove old canes to force new ones from the base and to shorten these during their first year to induce branching and flowering.

Species Shrub Roses. Most species roses are shrubs that grow from one to 10 feet tall. Since they grow that way,

Healthy stems of a tree rose should be pruned rather heavily, like this, in spring, so as to develop a compact head and strong new stems which can carry the heavy weight of the flowers

Frese



Salmon-pink floribunda rose, Fashion, makes a fine tree. This main stem needs staking

McFarland

treat them the same as spireas, loniceras or mock-oranges in shrub borders. Thin out old canes and cut back extra-long branches. Do not cut spent blooms because the hips or seed balls may be as colorful as blooms.

Scotch roses *(Rosa spinosissima)* and some others spread by root sprouts or suckers which may be removed by cutting below the soil surface with a spade, axe or heavy shears.

Rose Hedges. Rose hedges are mostly informal, not closely sheared. If low or compact hedges are desired, the shaping should start the first year and be persisted in by frequent though not close shearing. Choosing a variety that naturally grows about the desired height will result in a better effect and, of course, flowers. Floribundas as a class make good low hedges.

Caring for Tree Roses

Tree roses are produced by budding on a hardy understock, much as for hybrid teas, except that the bud is placed at 2, 4 or more feet upon the 2- or 3-year-old stem of some variety that makes strong, large canes, such as a hybrid rugosa, nutkana, etc. This means that the budded variety, such as Crimson Glory, Fashion, Queen Elizabeth, is grown at eye instead of ground level.

A named variety, grown as a tree, is no hardier than the same variety grown as a bush. Winter protection is definitely needed wherever covering is given other garden roses. For tree roses, this means a little extra effort, beginning with light pruning of top branches to make winter covering easier.

To winter-over tree roses, "heel them in" in a deep pit coldframe under a mulch of hay, straw or similar material, bury them completely in a well-drained spot somewhere else in the garden under mulch, or winter them in place by loosening the soil on one side with a spading fork as you carefully tip the plant over until nearly horizontal. In the last instance, trim the branches back to not over 6 to 8 inches each, put a pillow of leaves or sod under the main cane, dig a good hole for the head, bury it and mulch well.

Remember to put a few pieces or spoonfuls of mouse bait near the plants in long cans or jars, laid on their sides to keep out water or snow, for protection against damage by field mice. Otherwise mice may strip the plants of bark or nest among the buried stems for the winter.

When spring comes, remove the cover gradually over a period of several days to temper the plant to light and temperature. Finally, set the plant erect, tamp the soil as in planting, and tie it in several places to its stake.

Finish the pruning by removing the ends of the top branches to healthy green wood and leave not over three eyes on any branch. It is well to shade the top with paper or other cover and keep a pack of moist sphagnum moss or moist cloths on the head until the buds start to swell.

Pruning Bull Canes

Often, canes, starting at the base of bush roses, will grow exceptionally strong and tall. Such canes, called "bull canes," tend to dominate the plant. When about 15 inches tall, cut or pinch out the tip — just an inch or two. This helps other canes and tends to force laterals from it. Otherwise, it will grow too tall and produce a spray or cluster of mediocre flowers.

Pruning at Planting Time

Potted roses, of course, need no special pruning when planted — that was done when they were potted. Packaged roses and plants purchased in a dormant condition, usually have been root pruned and probably the tops have been sheared to one foot or less. Under most favorable conditions, that is sufficient. However, digging, transporting and replanting has been a very major operation for the plant. Usually it is more certain to grow if the amount of cane exposed to drying and the number of buds or eyes available for growth is reduced by pruning to 3- or 4-inch stubs.

Apple Tree in a Rose Garden

The focal point in the rose garden of Mrs. John E. Parsons is an apple tree, pruned to a compact, round shape, in contrast to the spire-like evergreens beyond. Fruit trees trained this way must be thinned enough to let air circulate through the branches

Frese

PRUNING FRUIT TREES

The fundamentals of training young trees and controlling the yield and vitality of mature trees

Leo G. Klein

THE framework, health, and fruit-bearing capacity of all kinds of tree fruits is determined by the pruning done to young trees within two years after planting. Within this time, the selection of good framework branches should be completed. If wide-angled (35° to 60°), well spaced branches are saved and all others pruned away while still small, future pruning becomes a relatively simple operation. On the other hand, improperly trained trees will not carry a heavy load of fruit, and major breakages often occur just when the tree reaches the age of maximum production.

The central leader type of tree with a strong leader and four lateral branches, spaced 6 to 8 inches apart along the trunk, facing in different directions, and forming wide angles (35° to 60°) with the leader or trunk is the ideal type of framework which will insure the maximum strength coupled with a good fruiting area at maturity. The lowest branch should not be closer than 20 inches to the ground for upright types, while naturally lower growing varieties or species should be headed somewhat higher with the lowest branch located 2 to 3 feet from the ground.

Most apple, cherry and plum varieties lend themselves nicely to this type of training, while minor modifications are usually necessary for most pear and apple varieties which have an upright growth habit. In such cases, the trees usually are trained to a modified central leader type in which the central leader is headed back two to three years after planting. This is done to encourage the growth of lateral branches and thus keep the fruiting area somewhat lower. Peaches and Japanese plums are difficult to keep to a central leader type, but even with them a stronger tree will result if its early training is of this type.

The open-center type of tree, so common in many old orchards, has serious defects, particularly the crowding of the main branches which all arise from approximately the same area of the trunk. This makes for weak, narrow crotches which are very subject to breaking under a load of fruit.

Pruning Young Trees

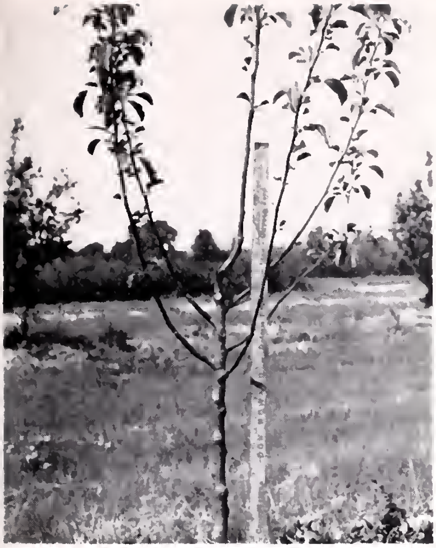
The principle that pruning young trees delays bearing should always be uppermost in one's mind. After the framework has been established, only very limited correctional pruning should be done until the tree begins to bear. Young trees which appear to be too upright in habit will naturally become more spreading due to the effects of carrying their first few crops of fruit. Hence the urge to thin out crowding branches in non-fruiting trees should be suppressed until after the trees have borne a crop of fruit. However, during this early non-fruiting stage some lateral pruning may be necessary in order to keep the central leader slightly higher than the laterals. While this may be done by cutting back the laterals, it is better to remove smaller secondary laterals from the main lateral branches. Laterals from main limbs which arise within 18 inches of the main trunk should also be removed annually during this period because they are not likely to become permanent branches.

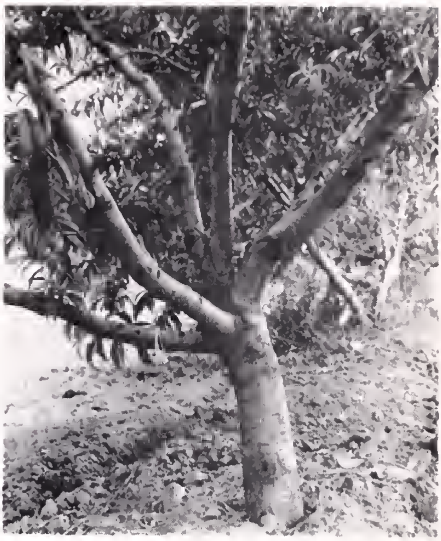
Pruning Bearing Trees

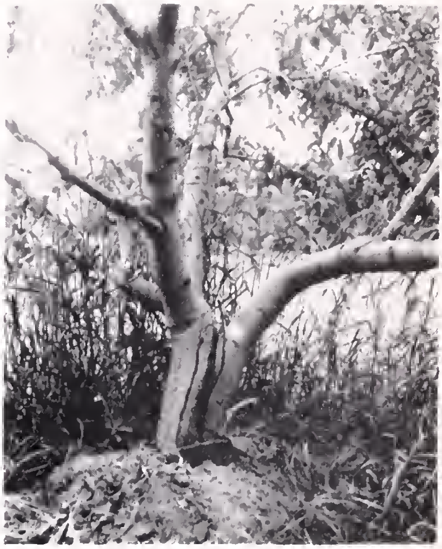
Moderation should be the keynote in pruning bearing trees. Weak, shaded branches which are usually found in the lower and inner portions of the tree should be removed as such wood produces only poorly colored, poor quality, small sized fruit. The removal of vigorous, productive branches in order to permit light to enter the center of the tree is not usually a profitable practice.

Peaches, which bear on one-year-old wood, require heavier pruning than apples and pears, whose fruit is borne mostly on spurs which are productive for several years. However, even with peaches, very heavy pruning will reduce yields and the commonly practiced, heavy heading back of bearing peach trees should be avoided because the slight gain in fruit size and easier picking is insufficient compensation for the resultant decrease in total yield. While it is true that heavy pruning keeps the trees vigorous, the same result can be obtained, without reducing yields, through better soil management practices which maintain a higher level of soil fertility and moisture, making it possible for the soil to support a larger, more productive tree. Heavy pruning with these tree fruits is hardly ever justified, except on very old trees or trees which have been planted too closely, or where trees have been planted on shallow soils which will not support a large tree. Peaches planted as filler trees between other kinds may often be retained profitably for several additional years through heavy pruning, or "heading back" of branches which are shading or impeding the growth of the permanent trees.

While it is not possible in many large orchards, it is better to give the trees a light annual pruning than a much heavier pruning at longer intervals. Light pruning is not likely to upset the nutritional balance of the tree, whereas heavy prun-







Central Leader Method of Training Fruit Trees

Top left. This 3-year-old apple tree has good, wide crotch angles, branch spacing

Top right. This peach tree has well-arranged branches which can carry a heavy crop

Right. Open-centered peach tree, improperly trained in the beginning, has bad crotches and is already splitting apart

Author photos

ing, particularly on relatively young trees, may reduce yields by causing the tree to revert partially to a vegetative, non-fruiting condition. Very old trees which no longer respond satisfactorily to good soil fertility and management practices may require heavy pruning, and once this has been resorted to it should be done annually and the cuts should be well distributed throughout the tree.

Time of Pruning

In colder regions, pruning is best done in late winter or early spring while the trees are still dormant. November and December pruning should always be avoided in cold areas as severe tree injury may follow such a practice. The hardier species, such as apples and pears, usually are pruned first while peaches, apricots and sweet cherries are not pruned until March, when the danger of severe freezing is past. Summer pruning of tree fruits, except for the removal of basal suckers, is not recommended.

Pruning Tools

Although power pruning equipment is now standard in most commercial orchards, the small grower or home gardener can do an excellent pruning job with relatively simple tools. A good pair of shears and a good swivel blade pruning saw are the two basic hand tools required, and will accomplish most of the pruning on all but very large trees. A pair of loppers and a pole pruner are also essential equipment for commercial orchards, and often for the amateur.

Treatment of Pruning Wounds

All large cuts which will not heal over within two years should be covered with a good wound dressing such as water emulsified asphalt, or even a good white lead paint. Toxic materials such as tar should not be used. Several satisfactory kinds of tree wound paint are available.

Pruning Dwarf Trees

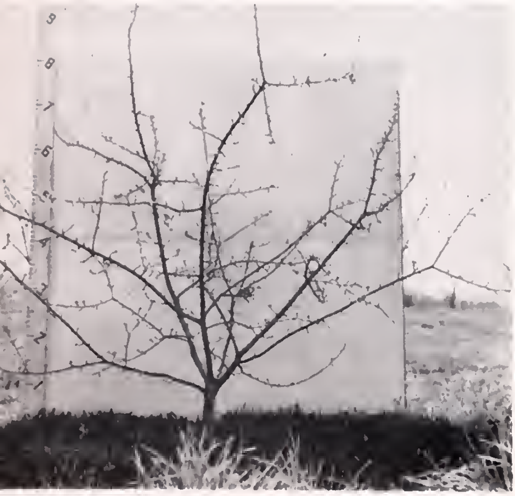
With particular reference to apples, dwarf trees are becoming very popular for the home gardener and pruning of such trees should present no real problem. The selection of main framework branches and the early care of the trees is similar to the treatment recommended for standard size trees. However, after the trees have borne three or four crops, it is recommended that the main branches be more or less uniformly shortened. This practice stimulates lateral shoot development which makes for a larger but more concentrated fruiting area and more shapely trees. The practice of removing thin weak wood should also be followed with dwarf trees.

Pruning Fig Trees

The bearing habit of figs is unlike that of the previously mentioned tree fruits. The main difference in the fig is that it bears its fruit singly in the axils of leaves on the current season's growth. With this type of fruiting habit it is essential to maintain a good supply of vigorous new growth and this is done by heavy annual heading back of the new growth so as to encourage the growth of laterals. Weaker laterals are also thinned out in order to keep the top more open and the fruiting branches exposed to sunlight. This pruning is done during the dormant period after the coldest weather is past but before growth starts in the spring.

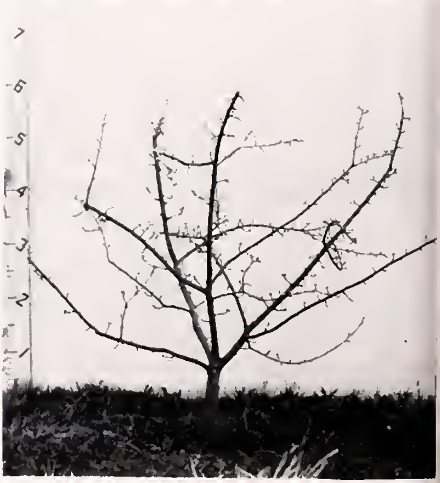
Some growers prefer a bush type fig rather than a tree type, and this is accomplished by planting the tree somewhat deeper and by permitting several main shoots to develop from the base. Regardless of the training system used, it is important with figs that all cuts be made flush with main branches or at a point where a side branch or bud occurs. Healing will be slow and decay may occur if stubs are left.

Eight-year-old dwarf apple before pruning



Branches were shortened during pruning

Author photos



Cornell Univ. photo

Raspberries grown in hills may be tied to stakes. Canes were pruned 5 feet high

Frese

Raspberries in rows may be tied to wire strung between posts. Prune tops in spring

BUSH FRUIT PRUNING POINTERS

John S. Bailey

PRUNING bush fruits is done for three major reasons. First, it helps to keep the plants healthy by removing dead, weak and diseased stems. This, in turn, aids the plant in maintaining its vigor. Finally, removing excess fruit buds prevents overbearing and the consequent loss of fruit size and flavor.

The most useful pruning tools are long-handled lopping shears and pruning shears. With lopping shears, it is easy to cut off old raspberry and blackberry canes at the base, or remove large branches (too big to be cut with shears) of currants, gooseberries and blueberries. Pruning shears are for lighter work, such as heading back raspberries and thinning currants and blueberries.

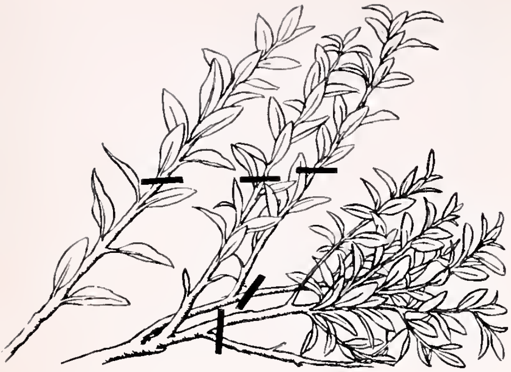
Pruning Bramble Fruits

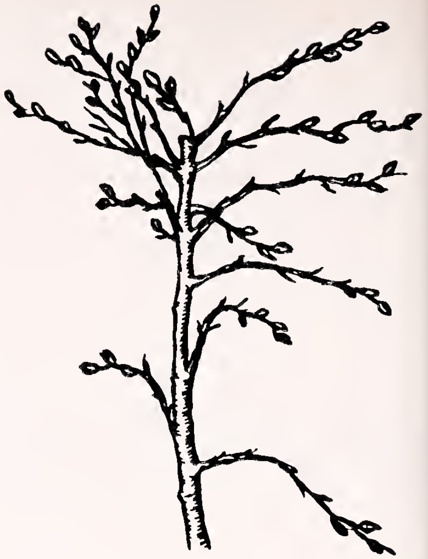
Tops of bramble type fruits are biennial; they grow one year and fruit and die the next. Fall fruiting raspberries are an exception since they will fruit at the ends of the canes the first season, and produce more fruit from the same canes, on laterals, the next season before dying. It is best to prune off, at ground level, the old canes after they have finished fruiting in summer. This helps to control pests and admits light and air to the new canes.

Cane fruits grown in rows, which is the best way to cultivate them, require some spring pruning which is best delayed until the buds start. Then, in general, prune away all dead wood, slender canes which will not fruit well, and the canes that are too far out from the row. Different kinds of brambles require special pruning, as follows.

Black and Purple Raspberries

Top the canes, during the summer, to develop vigorous fruiting laterals, by breaking off 2 or 3 inches of the end of





Pruning Blueberries

Wherever vigorous new branches arise from old ones, prune back as marked above. The shortened branches will branch again the next growing season, and bear flower buds, as illustrated at right

Sketches by Eva Melady

each cane. Black-fruited varieties are topped at 2 feet; purples at 2½ to 3 feet. The following spring, the laterals of black varieties are shortened to 6 to 8 inches in length; purple to 12 to 14 inches long.

Red Raspberries

Never top red raspberries in summer. Thin canes to 25 per 10 linear feet of row. If the row is kept 12 to 18 inches wide, picking will be easier. In early spring, cut back unsupported canes to about 4 feet high; prune supported canes to about 5 feet high.

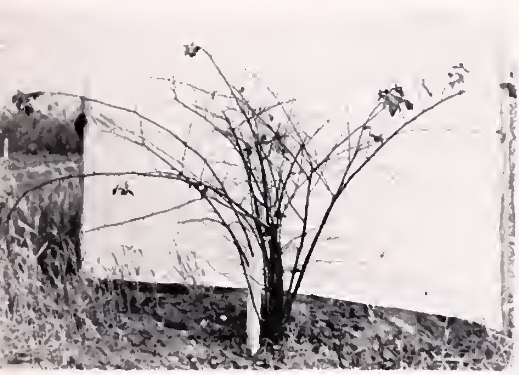
Blackberries

Top in summer, at 2½ to 3 feet. In spring, narrow the row, and leave 8 to 12 inches between canes. Cut back laterals to about 12 inches.

For semi-trailing varieties like Evergreen, Brainard and Himalaya, tie the limber canes to a trellis made of two wires strung at 5-foot and 3-foot heights between posts.

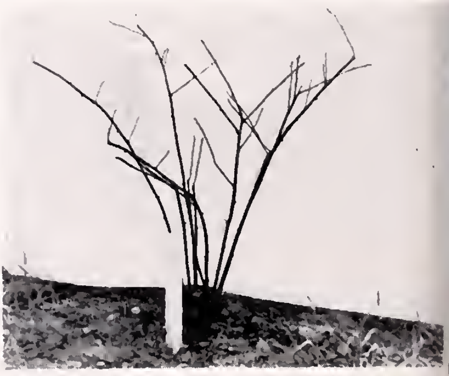
New shoots of trailing varieties, such as Logan, Young and Boysenberry, may run on the ground the first year. The second year, when they fruit, tie the canes

Blackberry bush, before pruning, has crowded stems and long, straggly growth



Old stems have been cut back to the ground, new stems and side shoots shortened

Text and photos courtesy Popular Gardening



in spring to a wire trellis or wind the canes up around a 6-foot stake, tie securely to the stake, loop the ends of canes over a cross piece at the top, tie, and prune off tag ends.

Currants and Gooseberries

Both of these fruits form bushes which are pruned essentially alike. The best fruit on red and white currants and gooseberries is borne on wood not more than three years old. Therefore, in early spring, prune away thin, dead and borer-infested canes, and remove all canes which have lost their vigor and no longer bear an abundance of fat flower buds on the main stems or side fruiting spurs. A mature plant may be pruned so as to have only three each of one-year, two-year and three-year-old canes. Remove low branches on which fruit would be mud-spattered.

Blueberries

New plants need little pruning until the third year. Remove only weak or dead branches. Thereafter, in early spring, prune off at the base, or just above a strong new side shoot, any weak older branches which fail to carry plump fruit buds at the ends. Thin new shoots coming from the base, leaving three or four of the strongest. Also thin the top of the bush, pruning off broken branches and weak twiggy branches. **Cut freely.** Heavy pruning results in a more vigorous bush and larger and better berries.

TRAINING AND PRUNING GRAPES

M. B. Hoffman

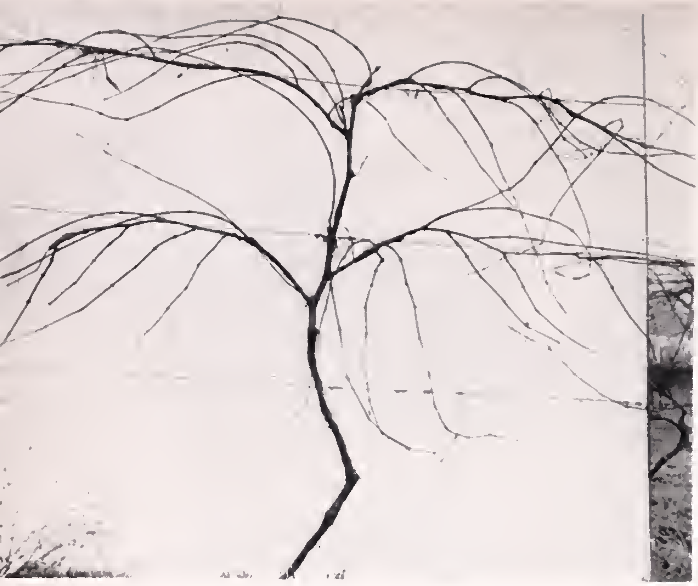
The grapevine is pruned to control the quantity and quality of both wood growth and fruit production. In pruning, the aim is to leave enough of the best of last year's wood to obtain maximum production of good clusters and to remove the surplus to prevent over-bearing and its consequent inferior wood growth. This is *pruning* proper. Pruning is also employed to make well-proportioned vines that are easily managed and kept within definite bounds. This is more correctly termed *training*.

There are many systems of training grapes. Only one is discussed here; namely, the Kniffin system. This system requires no summer tying, and is well adapted to the home garden.

A trellis is necessary to support vines trained to this system. It should be erected at planting time. The trellis has two or three wires (usually No. 9 or No. 10 wire) strung tightly between posts. The lower wire is placed 2½ to 3 feet from the ground, the upper one at the 5- or 6-foot level. Posts should be 8 feet long, set 2 feet in the ground, and 20 feet apart. This spacing allows two vines between each two posts. Posts of some durable wood such as locust or cedar are preferred. The end posts should be well braced.

A vine trained to the single-stem, four-cane Kniffin system consists of a single trunk which reaches to just below the top wire. After each annual pruning, from two to six canes — bright brown wood of the previous season's growth — are left. These canes arise from spurs or short arms of two-year wood and extend out on the wires in both directions from the trunk. From buds at the nodes of these canes, leafy shoots grow and bear the fruit. These shoots in turn become canes the following year. When this fruiting habit is kept in mind, training and pruning becomes simple.

At planting time, the vine is cut back to two buds. Both buds will likely grow into shoots, in which case the lower or weaker one is left to trail on the ground until its removal the following year. The more vigorous or upper shoot should be



Grape Before Pruning

This vine is trained to the conventional Kniffin four-arm system, for fruit production. The lateral branches and trunk are tied to heavy wire

tied upright to a stake to keep it straight and prevent breakage. This becomes the permanent trunk. When good growth is obtained, the trunk may be formed the first season. Next spring it is cut off just below the top wire and tied firmly in place. If growth is not vigorous the first year, the best cane should again be cut back to two buds and the process repeated to form a trunk.

The first canes to be trained horizontally along the wires arise from lateral buds on the young trunk. After that, canes can usually be selected from basal buds of the previous year's canes or from renewal spurs left for that purpose. An unpruned and pruned vine are shown in the illustrations above.

Once the training system is established the vines must be pruned annually. The amount of wood, or more correctly the number of buds, to leave is governed by the vigor of the vine. This may vary from 30 to 60 buds. A mature grapevine of moderate vigor should not ordinarily carry more than 40 buds. Leaving too many buds for the vigor of the vine greatly weakens growth and reduces succeeding crops. Since a mature vine, before pruning, may have several hundred buds, it is apparent that grapes require severe pruning.

The most productive canes should be saved for fruiting. These will be about ¼ inch in diameter with an internode length of 5 to 8 inches. Canes of small diameter and short internodes are unproductive and should be pruned off. The

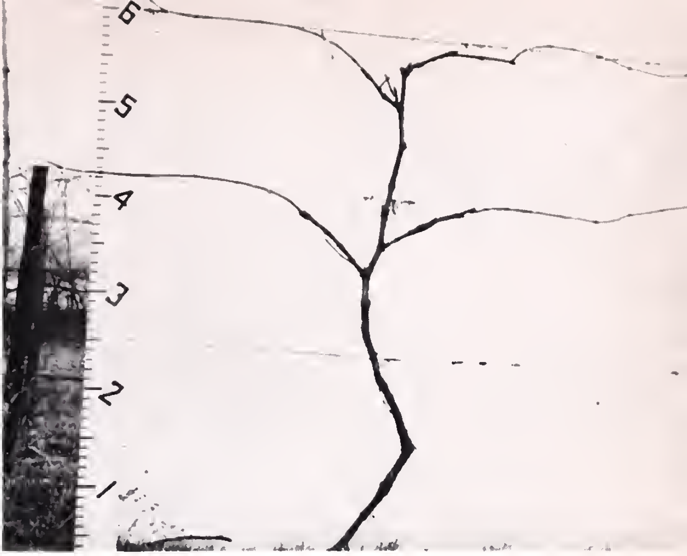
This grape vine, grown for ornament, is also severely pruned, but main branches are bigger and are trained to cover fence

Singer

Grape After Pruning

Only the four strongest lateral branches were kept. Flower buds and fruit will be borne on new shoots growing from buds along these canes

Cornell photos



amateur, by watching the vines closely, can soon learn to balance the amount of pruning with growth and production.

Since the grape has a long productive life and is on its own roots, it is possible to renew old vines that have gotten out of bounds and trail for great distances. Pruning the first year consists of limiting the vine to a few new canes originating as close to the trunk as possible. A vigorous sprout coming up from the roots, or at a low level on the trunk, should be retained and tied to the wires of the trellis for the purpose of renewing the old trunk. This sprout is handled similarly to a young vine, and after several years the old trunk can be cut entirely away. A vine that fails to send up a sprout or sucker may be cut off at the ground to force such growth.

Occasionally someone wants to grow grapevines on arbors, porches, and elsewhere to furnish shade as well as fruit. Here, the same principles of pruning are followed although the method of training is modified. The principal difference is the amount of old wood left, the number of buds retained, and the distribution of the fruiting canes. Usually the trunk is longer, and often it is desirable to leave short permanent arms along the trunk. Trained this way, shoots bearing the foliage will cover the arbor to the best advantage. Even then, the necessary renewal pruning should be given annually for best results. — Condensed from "The Home Fruit Planting." Cornell Extension Bulletin #913. Cornell University, Ithaca, N. Y.

As new shoots grow, they are trained to form a pleasing cover for the fence. Unwanted growth is pruned off, as needed

Everett

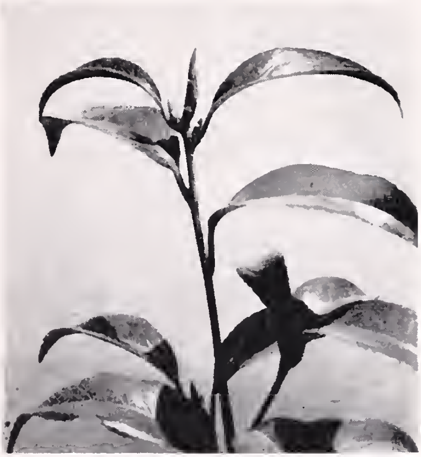
CAMELLIAS

Pruning plants in temperate climate gardens and under glass

Frederic Heutte

OVER the years, as I have watched and cared for camellia plantings, I have become convinced that a good sharp pair of pruning shears is the answer to their proper management. Through pruning, we can mould their individual characteristics. Since no two varieties are alike in size and habit of growth, they're adaptable to various uses such as hedges, standards, espaliers and even ground covers.

Annual pruning, especially after plants are over 10 years old, is a must for Japonica and Sasanqua varieties, as a means



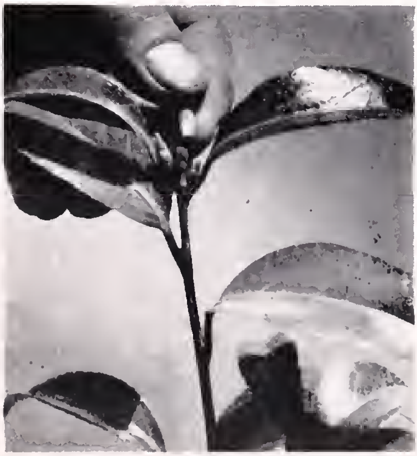
Tip Pinching of Camellias

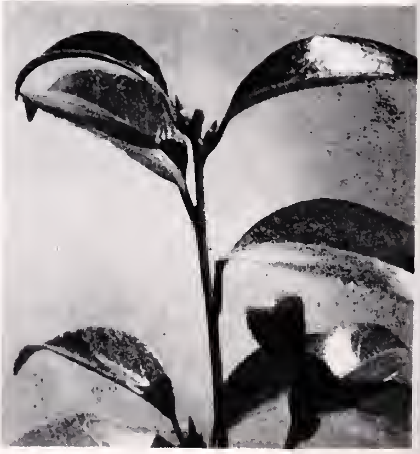
Left. Camellia shoot before pinching off the terminal growth bud in the spring

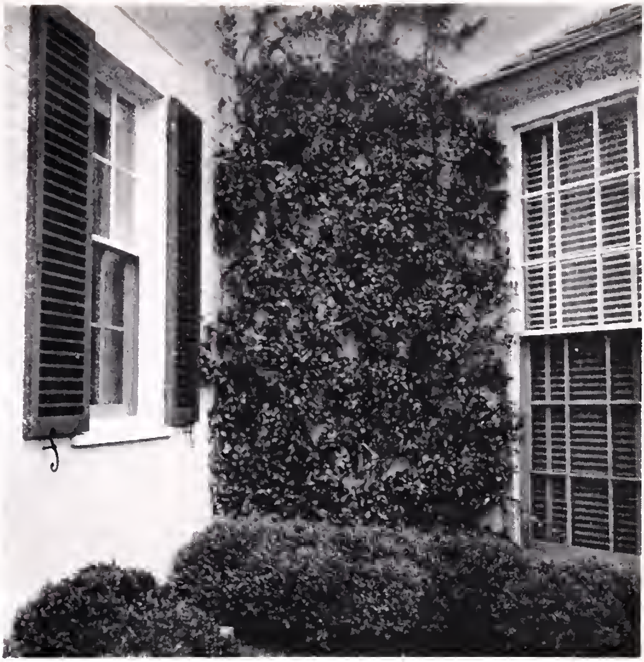
Below, left. Long, slender growth bud is brittle, and can be snapped with fingers

Below, right. With the terminal gone, plant is prevented from making spindling growth

Longwood Gardens
Hampfler







Sasanqua Camellia Espaliered

Open wall space has been covered with one Sasanqua camellia plant. When lateral branches extend too far from wall, they must be pruned back

Frese

of eliminating twiggy and superfluous growth which accumulates on the inside of the plants, being a good breeding place for scales, one of the camellia's worst enemies. Then, also, too many of us fail to realize, in dealing with long-lived shrubs of this sort, that judicious annual pruning is equivalent to a feeding because reducing the leaf surface and relieving the root system tends to accentuate the length of stems. Long cutting stems, incidentally, should dispel the idea that camellia blooms can only be used to float in a bowl or as a corsage. For example, 'Lady Clare,' 'Ville de Nantes' and many other varieties will develop 12- to 18-inch stems in one season under proper pruning and can readily be used as cut flowers.

Camellias have a record of living for two centuries, or more, under favorable conditions. We have proof that most of the original plantings in the vicinity of Charleston, S. C., made 150 years ago, still survive. In our Tidewater Virginia region, plants over 50 years old are still at their peak of performance where pruning has been practiced. Now that camellias are known to stand zero, or even below zero temperatures of short duration, their northern range is extended to New York. In each case, the health and beauty of the plants depends greatly upon pruning.

Most amateurs have not made a study of the individual growth habits of camellias, according to variety. Without this knowledge, it is difficult to know the amount and method to be used in pruning the plant. As an example, 'Mrs. Lyman Clarke' will grow as a perfect pyramid without the aid of a pruning shear to attain that form. 'Cluster Red' will form a perfect sphere. Both of these are relatively slow growers. On the other hand, 'Lady Clare,' 'Mathotiana' and 'Elegans,' with a little help, can be fashioned easily into standards. Most of the Sasanqua varieties are adaptable to hedges and espalier work. 'Shishi-Gashira' could easily be kept indefinitely as a ground cover not over 18 inches tall.

Pruning camellias for greenhouse culture is, of course, most essential as a means of restricting the plant to its allotted space and for the promotion of better quality flowers. To this end, disbudding plays an important part and so can be considered a pruning operation. The Japonica group is most representative, and with such outstanding varieties as 'Gigantea,' where a 6-inch flower is not unusual, leaving one single bud to each terminal should be practiced. Some varieties, such as 'Pink Perfection,' which are extra heavy bud setters, should be disbudded for the general health of the plant itself.

The Sasanqua group, while in need of essentially the same treatment in general pruning, is seldom disbudded, because it is better used as a landscape plant and not for cut flowers.

Reticulatas have come to the fore only in the last ten years. In the East they are used mostly for greenhouse culture. Reticulatas do not behave like Japonicas. Judging from my experience with this group, pruning should be restricted, because plants are subject to "die back" unless the cut has been made to an active growth bud. To cut a limb back to a dormant bud will not always result in new growth. Since these plants are inclined to be leggy and sparse of growth, pruning should be carefully done.

Camellias are best pruned *after their flowering period is over.* This is up to May from the Tidewater section to Washington, D. C., on the east coast. While pruning back on the "nub" is not advocated (to renew an old plant), nevertheless Japonica and Sasanqua varieties (not Reticulatas) do recover surprisingly well from radical pruning. I have seen many old plants which were cut back to the ground for grafting purposes grow back if the graft was unsuccessful.

So, when you buy a camellia, choose it not only for the color of its flowers but also its overall characteristics—then improve on it by judicious pruning.

PRUNING HOLLIES

Robert B. Clark

TO develop a symmetrical holly tree, methodical pruning is necessary from the earliest stages of growth right on to the mature tree. Holly can be pruned without hesitation, because evergreen kinds respond readily to the shears. However, an understanding of pruning principles is necessary first, followed by a determination to apply these principles with courage and vigor.

Once a holly cutting is rooted and potted up for growing on, the small plants are allowed to develop pretty much as nature disposes. During the second season, the leader or center stem may grow more or less laterally, and if it remains in this position indefinitely, a competing shoot may sprout near the base. The vigorous center stem should be trained to become the permanent leader and may need to be tied to a bamboo stake to keep it straight. All branches which interfere with its symmetry and development should be pruned away. Do not arrest the growth of the leader by pruning, even though its stature seems to be disproportionate to the rest of the plant. This condition simply indicate that the young plant is becoming established. Lateral growth, on the othe hand, is restricted with Procrustean abandon. Tips of lateral shoots ought t be snipped off to promote dense branching.

Author Robert Clark cuts holly branches for holiday decoration, yet does not disfigure the plant. The cut is being made here just above young side branches

Author photos

Holly tree-shape is improved by pruning off this extra-long branch; since it carries a good cluster of bright berries it will be most decorative indoors

When holly is transplanted from the nursery to its permanent site, the gardener prunes to assist the plant in becoming more readily adapted to its new environment. Broken, weak, spindly and crossing branchlets, of course, are removed. If the root ball should crumble, then drastic pruning is necessary. This process helps by decreasing the number of leafy shoots and helps to balance the tops with the disturbed and often decreased root system.

Cutting Holly for Christmas

Once established and fruiting, hollies provide sprays of berried greenery at Christmas time. Cutting holly at that season accomplishes three objectives. It provides choice holiday decorative material. It shapes the plant by restricting its size, and it also promotes a renewal of growth. Where one branch had been growing, two or even three new shoots take its place.

These new branchlets provide the wood necessary for producing large crops of berries. American and Japanese hollies bear flowers on wood of the current season, while the English and Chinese species bloom on wood developed the previous year. In either case, fruiting branches are no more than two years old. By keeping this wood close to the trunk the shape of the tree can be kept symmetrical and in proportion to the overall scale of the garden.

The mechanics of pruning need not be discussed except to point out that new branches arise from buds. Holly produces buds that are alternately disposed along the branchlets. Therefore, hollies are inclined to produce strong crotches since the branches are well spaced along the trunk rather than originating at one point. However, when cuts are made in such a manner that stubs are left it is likely that two branches will develop that are very nearly opposite one another. The danger in such instances arises only in the case of high winds or heavy snows, when splitting occurs at this weakest point. So it is wise, when heading branches back, to prune to the junction of an existing branch.

For hedge purposes, holly is a splendid choice in many regions. Shearing is the

McFarland

Christmas holly is now harvested from Pacific Northwest and Atlantic Coast orchards—a gigantic "pruning" operation

method used to make the plants compact. This technique stimulates branching and after a few seasons produces a densely growing hedge.

For uniformity in a hedge, use plants of a single variety, preferably propagated from the same parent plant. Among American hollies, good hedge-producing varieties are 'Hedgeholly' and 'Clark.' Japanese cultivars* that make acceptable low-growing hedges are the convex-leaved 'Stokes' and the dwarf cushion types such as 'Helleri,' 'Green Cushion,' etc. In the South, *Ilex vomitoria* and *I. cornuta* may be used for hedges. The inkberry *(Ilex glabra)* may be used for an informal hedge to resemble the billowy masses of boxwood, but has the disadvantage of becoming "leggy" after a few years.

Oriental effects may be obtained by shearing individual branches of the Japanese *Ilex crenata.* In this species the foliage is fine textured and the branchlets are compact. A pleasing effect is created by shearing so the separate larger branches stand out in distinct compact foliage masses.

Aside from gathering berried branches for Christmas decoration, the approved time for pruning is during the dormant season in early spring prior to the swelling of the buds. Summer pruning should be reserved for trimming of hedges and the removal of branches that fail to grow or are otherwise unsightly.

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*A variety of plant that originated under cultivation and which has been perpetuated by propagation.

PRUNING BOXWOOD

The health and shape of boxwood bushes are improved by timely pruning

Alden R. Eaton

IT would appear that English-speaking gardeners had to meet the problem of pruning boxwood long before Columbus even thought about the discovery of distant lands. The Oxford-English dictionary tells us that tree and dwarf box thrived in 14th and 15th Century England and was "much used in ornamental gardening" for the edging of flower beds.

Common boxwood (*Buxus sempervirens)* actually originated in Southern Europe, Northern Africa, and Western Asia and probably came to America with the early settlers of the mid-17th Century. The noted 18th-Century botanist, John Custis, referred to boxwood in Williamsburg, Virginia in a letter to Robert Cary in April of 1726.

In the ensuing centuries, the popularity of boxwood and the ease with which it is propagated resulted in its spread along the Atlantic Coast from Massachusetts to Georgia. In fact, common boxwood has become so prevalent in some sections of our country that it is often referred to as American box.

It is true that many large, ancient specimens of boxwood can be observed around old houses or home sites which seemingly indicates that they thrive with no apparent care. However, there is no evidence to show the number of fine plants that must have died because of neglect.

Routine pruning is an important factor in keeping boxwood plants in a healthy condition. In addition, there are other reasons too: keeping a plant specimen at a desired size; clipping formal and informal hedges; training topiary pieces; and drastically reducing overgrown or storm-damaged plants. But, bear in mind that the natural habit of growth of boxwood is usually its most pleasing characteristic, so pruning and clipping should be limited as much as possible if there is adequate growing space.

Routine pruning of boxwood includes the removal of all dead, broken, diseased, and undesirable parts of the plant. All dead leaves and twigs lodged in the inner branch crotches should be removed annually. This routine pruning and gen-

Boxwood makes such compact growth that plants can be trained into many unique forms through pruning and shearing

McFarland

eral cleanup can usually be done most efficiently during the slack winter season, but the temperature should not be below freezing. Boxwood branches are very brittle and break very easily in freezing weather. If winter season pruning is not convenient, however, it can be done at any time of the year.

Formal boxwood hedges, specimens, and topiaries are usually pruned to keep the plants within certain bounds. This clipping is done normally in early June as soon as the new growth has hardened. Another pruning is desirable in late June or July. It is best not to shear such plantings after August 1 (July 15 New York area) because late clipping will encourage new growth which will not mature before freezing weather.

Sometimes it is necessary to prune an informal boxwood specimen lightly even though it has plenty of space in which to grow. At times boxwood will form a thick outer layer of leaves so dense that most of the light is excluded from the inner parts of the plant. It is often desirable to break this outer layer or shell by "pinching," which in this case involves removing small branches with hand pruners, to break up the outer shell and still preserve the pleasing outline of the plant. This opening up of the inner parts of the plant encourages growth back along the branches and generally improves the health of the plant. Pinching should be done in early spring just before growth starts.

Most people consider boxwood a slow growing plant. However, under favorable conditions boxwood specimens and hedges will often outgrow their intended bounds in a few years if pruning is neglected. Hedges will close in on walks; specimens will crowd buildings and other desirable, but less vigorous plants. Generally speaking, boxwood thrives on drastic pruning and with proper care will recover rapidly.

This drastic pruning is done by first cutting large branches back beyond the foliage on just one side of the plant. The following year the other half of the plant may be pruned similarly. A sharp small-toothed saw should be used to make cuts on branches over three-quarters inch in diameter and all such cuts should be coated with shellac and tree wound paint. Hand pruners can be used to make the smaller cuts. This type of pruning should be done in March just before new growth starts. All plants pruned in this manner should be fertilized and mulched and be given adequate water throughout the year.

At times, hedges require a

Pleached alley of American beech at Colonial Williamsburg was started on a wooden frame, but the intertwined branches now support themselves

Roche

Colonial Williamsburg photo

Boxwood clipped into hedges and various forms in Orlando Jones garden in Williamsburg

less drastic treatment. If the depth of cut is not below the foliage line, the whole operation can be done at one time. This pruning should be done in early spring just before growth starts.

Winter Damage

All boxwood plants, large and small, are subject to snow and ice damage. There are no practical pruning practices which will prevent this damage. It is important that damaged plants be pruned before the new growing season. All broken branches should be removed with clean cuts, and scars cleaned and treated with shellac and tree wound paint. It will help a damaged plant if the undamaged branches are cut back to encourage lower branching.

This winter damage hazard has been with us in Williamsburg for at least several centuries. John Custis noted in a 1737 letter to his friend Peter Collinson that "the severest winter in the memory of man killed a great deal of my Dutch box edging."

Today, boxwood presents about as many pruning problems as it ever did, despite our motto at Colonial Williamsburg "that the future may learn from the past." Further, it would not be going far out on an unpruned limb to predict that gardeners two centuries hence will probably be facing many of the same predicaments, for boxwood will always be a desirable plant because of its many interesting and pleasing characteristics.

HOW TO PRUNE CLEMATIS

Dorothy Falcon Platt

PRUNING clematis is, at times, a controversial subject among experts, but one salient point stands out: to understand it one must know the taxonomic group or section to which each variety belongs.

This is a matter which varies in the individual groups, for some flower only on the old wood, others only on the new wood, while still others flower on both. So, as far as pruning is concerned, hybrid clematis are divided into sections which correspond to their heritage.

The Florida, Patens and Montana sections bloom on lateral shoots of the old wood. They should be pruned sparingly just after flowering, removing the weak or straggling branches.

The Jackmani, Viticella and Paniculata sections bloom on the new summer shoots so it is a *must* that these *should* have their growth cut back each season to within one or two feet of the ground.

For the most part the species clematis should be pruned vigorously in the spring, *C. montana,* which is a species, being an exception.

The Lanuginosa group is the section in which opinion differs, some feeling that they should have only the weak and straggling growth removed, while others strongly believe that they should be "whacked" annually like varieties in the Jackmani section.

Perhaps there is right in both opinions—it depends on what you want. For the Philadelphia area, severe pruning will retard flowering until midsummer when some people have left for summer vacations away from home. Less severely pruned, they will bloom in May or June.

No doubt the locality has much to do with the results. In New England, where the vines probably are killed to the snow line, nature does their pruning for them. They then bloom at the season which is natural for them and there is little doubt that the severe pruning produces larger and finer flowers.

The flowers of varieties in the Coccinea section are borne on the current year's shoots but *C. texensis* in that group is herbaceous and dies to the ground each winter.

In the Philadelphia region, clematis will often show green leaf buds as early as February and as soon as they are visible, pruning can begin.

Pruning must be done with the greatest caution as the stems are very brittle and often what appears to be a dead

C. paniculata flowers best when pruned dow
to 2 feet in early spring

Gottscho-Schleisner

The Classification of Clematis

Clematis Lanuginosa Hybrids

Crimson King
Elsa Spaeth
Fairy Queen
Henryi
Lady Caroline Neville
Lady Northcliffe
Candida
Lawsoniana
Lord Neville
Nelly Moser
Mme. Van Houtte
Prins Hendrik
Ramona
W. E. Gladstone
William Kennett

Clematis Jackmani Hybrids

Comtess de Bouchard
Crimson Star
Gypsy Queen
Jackmani
Jackmani rubra
Jackmani superba
Mme. Baron Veillard
Mme. Edouard Andre
Mrs. Cholmondelay
The President

Clematis Viticella Hybrids

Huldine
Mrs. Spencer Castle
Lady Betty Balfour
Ville de Lyon
Royal Velours

Clematis Coccinea Hybrids

(also called Texensis Section)

Duchess of Albany
Duchess of York
Countess of Onslow
Texensis

Clematis Florida Hybrids

Duchess of Edinburgh
Belle of Woking
Mr. G. J. Patijn

Montana Section (Species)

Montana alba
Montana rubens
Montana undulata

Clematis Patens Hybrids

Edouard Desfosse
Miss Bateman
Lasurstern

Clematis Species

Crispa
Macropetala
Tangutica obtusiuscula
Paniculata
Recta mandschurica
Spooneri rosea

branch may have an end with many coming buds on it.

Training the vines goes hand in hand with pruning—it is the complement to it. During the early season the rapidity of growth is amazing—often 3 or 4 inches in twenty-four hours. They twist and twine around themselves, resulting in a close formation of the flowers which overlap and almost smother themselves when in bloom. They are much more effective in appearance when separated. This necessitates constantly drawing apart the growing ends. When the leaf tendrils are young and tender, this is easy; one can untwist them with ease and with no ill effect.

The early pruning is much more difficult as last year's hardened leaf tendrils have become like wire and have wrapped themselves with unbelievable tenacity around anything within reach. Cut all these old leaf tendrils off close to the stem and remove them before training the vines in the spring. It is troublesome but well worth doing. The stems can then be separated and flattened out against a fence or other support, and tied firmly in place with a soft string. Do not use Twistems—so excellent for many other uses. They are too harsh for clematis. One can bend the stems gently, crossing and spacing them at will, tying them to each other at intervals.

Large mesh chicken wire, tacked or fastened to a wall or fence, is an excellent support. As the tendency of the vines is to grow high, some of the growths can be trained down and around.

Newly planted clematis should be pinched at once to induce more growth from the base. This is hard to do when one is eager for quick results, but it will amply repay in the long run.

Roche

Most gardeners prefer only light spring pruning for large flowered species or varieties like *C. lawsoniana*

PRUNING GREENHOUSE AND INDOOR PLANTS

Everitt L. Miller

GARDENERS searching for something different in plants for their gardens, window or greenhouse, will enjoy growing a few semi-tropical or tropical plants which are often considered satisfactory only in the hands of professional gardeners. These may be trained in their natural form or, as in the case of heliotropes, geraniums, lantanas and fuchsias, be controlled by pruning to assume different shapes, including the tree or standard plant with a main stem three feet or so high, held up with a central stake, and a branched flowering head.

Following are directions for pruning and pinching some of the most popular plants which, in the North, are grown in greenhouses or in tubs or other containers for summer color and the decoration of patios, terraces and other outdoor living areas.

Fuchsia

Fuchsia may be grown either as a potted or basket plant. The average basket makes a beautiful showing for two to five years, but the plant may last as long as ten years, growing in the same basket. Cuttings are made about February 1 and placed in baskets about April 15. At this time, the plant is given its first pinch, to encourage breaks and to form new shoots. The second pinch should be about June 1 (note pictures page 246) and by this time there are ample branches to completely fill the basket. When the basket has completed its blooming season, which is normally by the end of July, the old wood is pruned back severely. At the same time, watering should be held to a minimum. The plant then will continue to grow throughout the summer, and will bloom again during the fall and winter. A severe pruning is again given about December 1. The material resulting from the pruning may be used for new cuttings.

Geranium—the Martha Washington Type

Hard pruning is given to these plants after the flowering season, which is usually the end of June. Prune with knife or shears so that about one inch of new growth will remain on the plant. Then top dress or repot the plant and place in a sunny location for summer growth. Feed with a complete fertilizer two or three times during the summer. New cuttings for propagation are taken after growth has matured in the fall. The plants are kept in a sunny, but cool, location during the winter at a night temperature of 35° to 40° F. Prune again about February 1 when plants are brought into a warmer greenhouse to start the growth and flowering. This pruning is mainly for shaping the plant and cutting out odd branches.

Hibiscus

This plant, usually grown as a tub specimen, may be pruned any time from January to June, depending upon when blooms are desired. Pruning during January or February will produce blooms in summer and fall, while pruning in May and June will cause the plant to bloom during winter and spring. Personally, I prefer to prune during February, which produces beautiful flowers on the plants into fall. After pruning, which is severe and back to the old wood, the plant is left on the dry side, for excess watering at this time will cause the leaves to turn yellow.

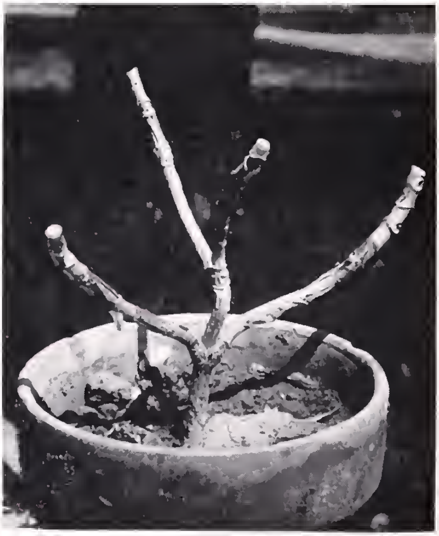
Florist Hydrangea *(H. macrophylla)*

Since this type of hydrangea makes its growth during early spring, usually by May 1, the plant should be thinned to leave only five flower stems to the plant (usually there are ten or more at this particular time). The thinned out ma-

The florist type hydrangea, grown as a pot plant, blooms like this in spring

When the flowering period is over, prune the plant back to a few short branches

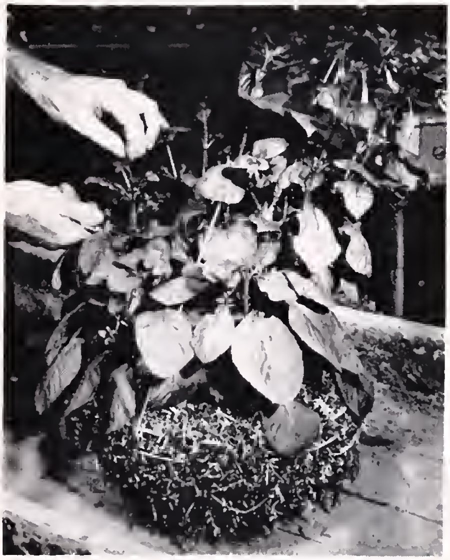
Longwood Gardens photos



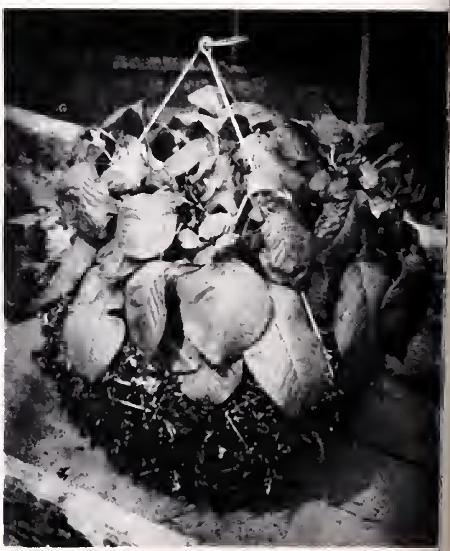
Training Basket Fuchsias

Only by pinching plants while they are young will fuchsias in hanging baskets develop into compact, shapely plants

terial may be made into cuttings and treated accordingly. After the plant has completed its blooming period, which is usually the end of June, prune back severely and keep the plant on the dry side. It is important to give the plants light shading, such as lath or netting, during the summer, especially between 10:00 a.m. and 4:00 p.m. Hydrangeas may stay out in the fall until they have received one or two light touches of frost. This



Pinching a fuchsia basket, to encourage low branching, is done early in June



The same basket, at right, shows how all slender tips have been snipped off

Longwood Gardens—Hampfler

will cause the leaves to drop. The plants should then be moved into a cellar or storage place for resting where the night temperature is between 35° and 40° F. Around January 1, the plants are brought into the greenhouse where a night temperature of 50° is maintained. Here they will continue to grow and flower.

Poinsettia

Poinsettias are usually pruned back to 18 to 24 inches after they have completed blooming, which is usually during January. The plants are then kept on the dry side until April 1, at which time they are brought out of storage, given water and kept in the greenhouse with a night temperature of 50°. Cuttings are taken from early May to September 1. It is also possible to keep the old plant and grow it on during the season, but the plant will need a few pinches for good branching. The earlier the cutting is started, the more pinching you will have to do, to encourage branching. It is very important to feed poinsettia plants during their growing season.

Genista

Genista is another plant that is pruned hard after flowering, leaving about one inch of the new wood and cutting out all small and fine branches. At this time the plant should be top-dressed or repotted, placed in shade and kept on the dry side until growth starts. Feed every two weeks during the summer until plants have fully grown. This plant will take a light frost during early fall and should be stored during the winter in a place where the night temperature does not get below 35° until time to bring it into bloom in a cool greenhouse.

Oleander

The oleander needs very little pruning, except to keep it in shape and from growing too high. The plants adapt easily to growing in various shapes and may be pruned to tree form with a single trunk. After blooming, dead flowers should be removed and any light growth on the inside of the plant should also be removed. Pruning will encourage growth and make an oleander stronger. During winter, keep the temperature at 35°. Oleander will also take light frost in the fall.

Camellia

Tubbed camellias need very little care. The purpose of pruning is to keep the plant compact and for the removal of dead and weak branches. To keep the plant in good shape, pinch while it is still small. Using thumb and fingers, just remove the terminal bud in spring when it starts to swell and grow. This will encourage new breaks along the stem. Light pruning of some of the inside small branches will help to keep the plant airy. An occasional pruning of branches that affect the shape of the plant should also be done. Here again is a species which may be kept cool during the winter since it likes a night temperature of 45° to 55°.

William Westenfeld takes poinsettia cuttings from old stock plant at Brooklyn Botanic Garden; pruned back hard in spring, cuttings are made from new growth

Mumay

PRUNING IN FLORIDA

Plants in semi-tropical and tropical regions need frequent pruning to control their growth

Hamilton Mason

GARDENING is a year-round activity in Florida, and in states having a similar climate, and so is pruning of one kind or another. There is no one time when pruning shears get a big workout. They are in use at different times of year for different reasons.

In general, prune tropical and semi-tropical plants from March to September or October, depending on the section of the state. During winter, prune dormant plants that will flower on new wood of the coming season, as crape-myrtle and oleander. Prune plants that bloom on wood of the preceding year after flowering, as spirea, philadelphus and *Hydrangea macrophylla.*

The amount of pruning to be done, except for dead wood, depends on the gardener's personal taste and the limitations of his garden. Regardless of the amount pruned, cuts are made back to a side branch or to a bud. This minimizes danger of disease troubles and also creates a neater appearance when the job is done.

Many plants will get too large for the spot they occupy unless pruned. Elaeagnus is one of the worst offenders. Fortunately, it responds well to frequent pruning during summer and fall and so is excellent for a hedge, if the work of maintaining it is not too discouraging.

Pruning Azaleas

Formosa azaleas are fast growing and will soon obstruct nearby windows. Cut back in early spring after flowering. A strong, succulent branch often shoots well above the rest of the bush. This should be cut off at the point where it starts growth. If cut back even with the rest of the shrub, it will soon emerge again and spoil the general symmetry. Similar succulent growths also appear on citrus and abelia and should be handled the same way.

Azaleas are an exception to the rule of cutting back to a node. Branches can be sheared at any point without harm to the plant. To cut back each branch of a large plant to a node would be endlessly tedious work. New growth appears quickly and conceals stubby twigs. Pinching of new growth to develop more flower buds continues into July.

If plants are used for formal hedges, there is always a sacrifice of flowers. Ligustrum, pittosporum and viburnum may be pruned at any time of year if need be. In warmer parts of Florida and other near-tropical regions, hibiscus and ixora are popular for hedge use and are pruned after flowering, if the blooms are to be enjoyed at all.

Camellia sasanqua is more successful as an informal hedge, but a semi-formal appearance can be obtained by pruning after flowering.

Some flowering shrubs need severe annual pruning in late winter or early spring. These include plumbago, thryallis, Turks-cap (*Malvaviscus arboreus*) lantana, tibouchina and duranta. Occasionally, cold weather does the worl and that is all to the good.

Poinsettias will grow out of bounds i not given attention two or three time between spring and September. The should be cut back to 12 to 18 inche from the ground after flowering. Subsequent new growth is pinched back i June and again in August or Septembe

Plants are thus made more compact and less subject to wind and cold damage than those that are allowed to tower to the rooftops.

Pruning is a simple device for making shrubs produce more flowers. Both the allamanda and Chinese-hat plant (*Holmskioldia*) benefit from spring pruning and occasional pinching back. Instead of vining, as is their tendency, they will make cascading shrubs with more branches and, consequently, more flowers.

Pentas, though often considered a perennial, gets to be shrubby. A very fast grower, it needs pruning (which can be done in the form of cutting flowers for indoor use) to make it compact.

Barleria will often grow to one or two shoots if not topped and then pinched to make it bush out so that the display of violet flowers in winter amounts to something.

Calliandra haematocephala (powder-puff) is a large, open shrub if left to itself. By cutting back all the branches about a third during summer—as late as September—it becomes more dense and produces greater masses of flowers from November through the winter.

Gardenias are sufficiently pruned by cutting the flowers. So are camellias (japonica) but tea scale may be lessened by elimination of a few overlapping branches. If roses are cut with long stems, that should be pruning enough, although some gardeners believe in general pruning in January. Canes should be cut back only one-third.

A very few tropical plants have their own particular method of being pruned. Crotons can get leggy and ugly. Instead of cutting off the offending branches, air layer them and have more plants. Bananas are not actually pruned. Stalks that have finished fruiting are cut off at the base and thrown away as they do not fruit a second time. Suckers produce the next crop. Pruning of palms consists of removing dead fronds or, when they are transplanted, of all leaves except the upper two or three.

Tropical plants of any size need to be cut back when transplanted so as to balance root loss. This work begins in March and continues throughout the summer. Enough time must be allowed for plants to get re-established before winter. Plants that have been pruned are not in robust condition and are extremely vulnerable to early frost.

Tropical vines are fast growers and, after the first two or three years, need severe annual pruning after flowering. Examples: *Bauhinia galpini* (can be

Cutting flowering branches from crape-myrtle and other ornamental plants is an effective pruning method in warm climate areas, where growth of plants is rapid

Photo from Jacksonville Journal

kept to shrub by pruning), *Beaumontia grandiflora, Congea tomentosa, Heteropteris beecheyana, Jasminum amplexicaule, Podranea ricasoliana, Quisqualis indica, Tecomaria capensis, Thunbergia grandiflora.* In North Florida, pruning of tropical vines that finish flowering in late fall or early winter should be deferred until the end of March.

Pruning of cold-damaged plants is dictated by the amount of damage. This sometimes cannot be determined until the following June or so (August, in the case of palms). Pruning should not be done until danger of freezing is over, generally March. Scratch bark and if it shows brown, cut back to healthy, green wood. Many plants revive from the roots and so nothing should be removed until at least early summer.

Dead wood may be removed at any time. It is a periodic job with roses and azaleas. Dead wood on camellias and hollies often indicates dieback for which the only known check, so far, is cutting back to healthy wood.

THERE IS A DOUBLE VALUE IN PRUNING

Cutting off branches can improve a plant's shape and yield materials for decoration too

Margaret Dodson

EVERGREENS and shrubs which form a background for flowers in my garden, are invaluable also for flower arrangements in my home. There is always a supply of interesting textures, forms, and colors at every season of the year. From early spring throughout the summer and fall, and especially for Christmas greens, branches, foliage and pods are mine just for the cutting.

I prune carefully and remove branches that have a tendency to grow too long. Interesting curves for graceful lines are usually found in back of, or on the far side of shrubs where branches are stretching for more light. Trimming these straggly growths improves the plant and gives it a better shape, and also provides a background in my flower arrangement. A basic outline in an arrangement, once established with an evergreen branch, will outlive many changes of fresh flower accents. When I speak of evergreens I mean broad-leaved as well as needle-bearing types.

It is my opinion that most any evergreen is in harmony with flowers at any season of the year. It is true that holly pine (and other needle types), are mor closely associated with the Christma season, but when my daffodils bloom i the border under pines and in front o taxus and junipers, I feel they can b compatible in a flower arrangement.

Some of the broad-leaved evergreen which grow in my garden — andromeda leucothoe, mahonia, aucuba, *Ilex crenat* box, euonymus, ivy, azalea, and rhododendron — offer most interesting complements to all types of flowers. Pruning short stems of andromeda gives m many lovely rosettes of glossy leaves t fill in around weak-stemmed flowers. do not mind sacrificing a few bloom from azaleas when I prune the long tips to use with any kind of flowers fruit, as the foliage is so clean, smoot and easy to combine.

Berried shrubs, like other kinds, mu be controlled. I like to cut mine when can use and enjoy arranging the fruit. The pink speckled berries of *Elaeagnus umbellata* are lovely with chrysanthemums. Pyracantha yields its orange or bright red clusters until December. The more I cut back my ivy, the more dark blue berries it produces; these are charming in arrangements in the fall.

Most often ignored evergreens are the chamaecyparis. The two kinds in my garden, a soft feathery green one *(C. pisifera* var. *plumosa)* and another with fine blue-green needles *(C. thyoides* var. *'glauca')*, I find very useful. If not pruned judiciously they will grow out of bounds and become straggly, therefore scorned as ugly things. I have found some of the most interesting silhouettes for arrangements on my trees; these I cut with my long pole pruner. Reaching branches high above my head I have improved their shape by constantly cutting them back. Never have these evergreens been sheared into a cone shape, but by cutting off longer branches at intervals they have developed a natural appearance.

The same treatment has been used on my hemlocks which require a great deal of pruning to keep them under control. The cuttings from hemlocks do not always find their way into background designs of flower arrangements, but are exceedingly useful as a mechanical aid. Tall vases used each Sunday in church require some sort of prop for the flowers. So far, I have been able to provide quantities of hemlock branches. Inserted vertically into the bases and sheared off at the top, they make a good clean framework for flower stems. Committee members find this method easier to work with than using other aids.

My deciduous shrubs usually get their pruning in their blooming period. If lilacs, weigela, deutzia, rose-of-Sharon, forsythia and many others are not cut back when in flower, they will need to be restrained by pruning at some other time. I have a lovely fothergilla which grows much too fast after it blooms unless I cut it severely when its interesting bottle-brush flowers are attractive for use in arrangements. Summer and fall foliage of forsythia is very useful for line backgrounds long after the yellow bells have gone.

Branches of magnolia are more interesting in bud than when in full bloom. Pruning magnolia then, and also paulownia tree branches in bud in the winter, can provide some intriguing branches to combine with dried materials as well as with new growth. Twisted, gnarled wisteria stems must be removed from time to time, and when carefully cut they can give a most exciting rhythmic line.

When evergreens are dormant from November to early spring, pruning can bring them into perfect shape, but best of all they provide me with greens for Christmas decorations. How much more beautiful roping is when made of small snips of chamaecyparis, white pine, taxus,

Paulownia tree buds, gathered in winter, give ieight, outline and distinction to this arrangement by the author

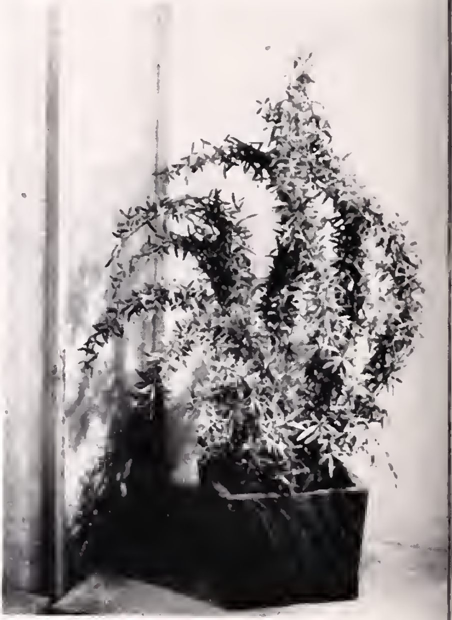
Boutrelle-Sevecke

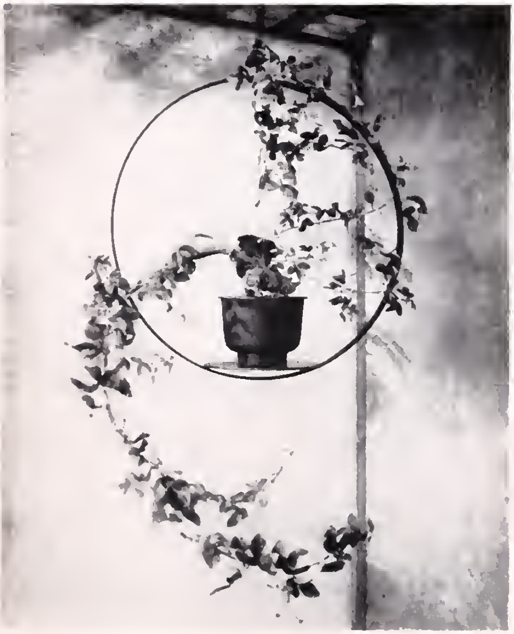
juniper, and box than the usual balsam and laurel one buys from the seller of Christmas trees. A wreath of cones and seed pods can be a true conversation piece, enhanced by tucking in small sprigs of ilex or box or mounting it on a wreath made of greens from the garden. Cutting off mature seed pods of baptisia, rose-of-Sharon, tree peonies, poppies, yucca, sweet gum, sycamore balls, to mention only a few, gives one an infinite variety of forms to be used naturally or gilded. Collecting cones directly from pine trees when they are still green can be very rewarding since they do not open so wide and hold a certain amount of color.

The seeing eye and the sharp clippers can produce materials from the garden for flower arrangements more exquisite and interesting than from the most exotic flower shops. The flower arranger who grows her own materials soon learns to prune for use and beauty.

ESPALIER IN THE MODERN MANNER

This espaliered plant (*right*), designed for terrace decoration, is growing in a wooden container painted with a contemporary Swedish design. The more or less spiral pattern was achieved by training the upright branches of a young plant to a wire form. Designed by Mrs. Robert C. Bourne and Mrs. Josiah Macy, Jr.



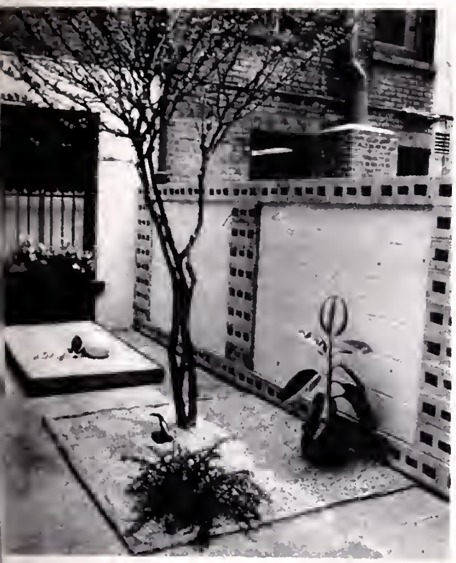


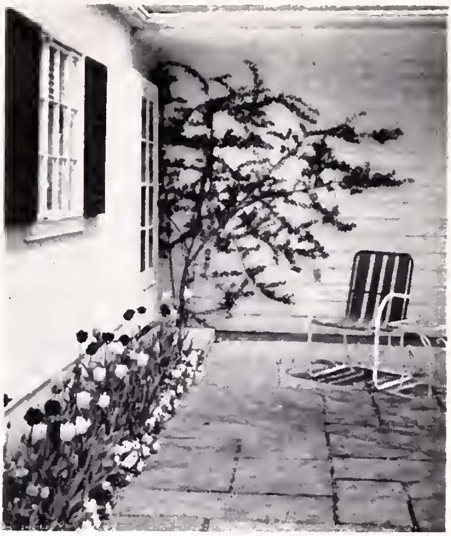
The full beauty of foliage and form of this passion-flower vine comes to view through training the plant in an Oriental manner. Mrs. Howard P. Serrell chose a copy of an old Japanese iron urn as the container, which is welded to the iron hoop. This vine bloomed all summer outdoors. Both espaliers were exhibited in the Garden Club of America section of New York's Flower Show

John Hugelmeyer photos

Japanese holly (*Ilex crenata*) which will grow well in partial shade, is trained (*at right*) as a flat pattern against the wall by pruning off projecting branches and thinning the rest to improve the overall design

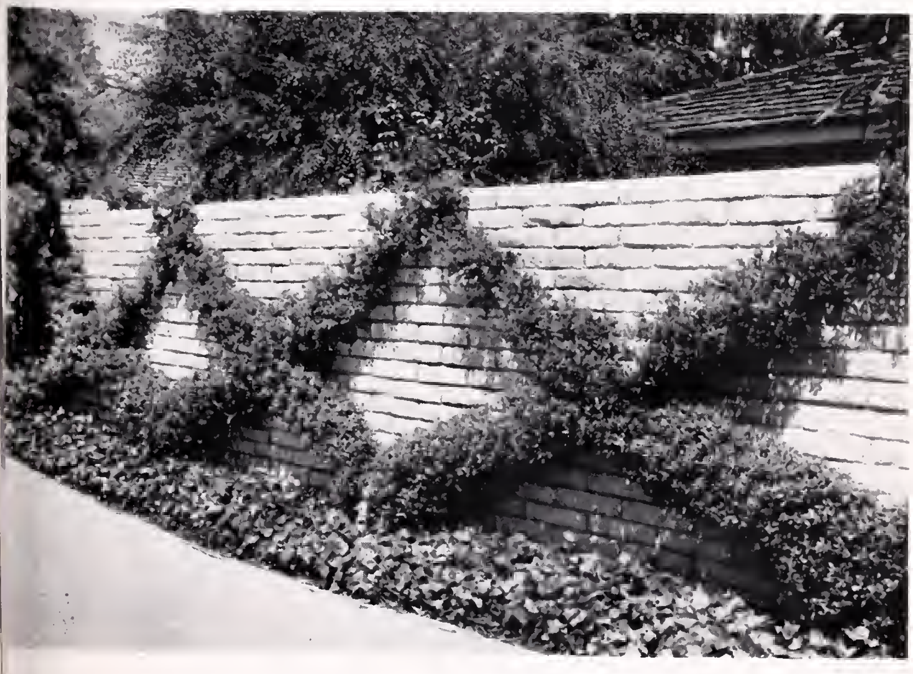
Gottscho-Schleisner



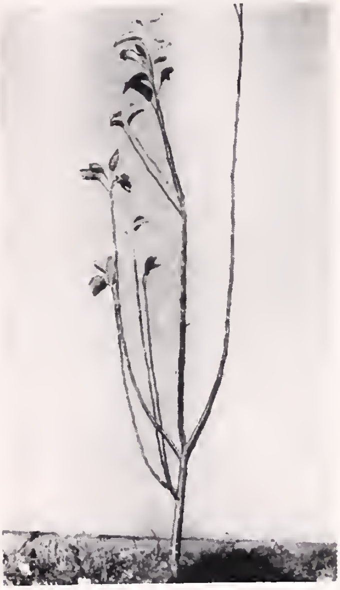


The basic pattern of the trunks of rose-of-Sharon (*Hibiscus syriacus*) are revealed by pruning away all lower branches and letting upper part make overhead canopy. Karl Linn, landscape designer

Diamond pattern of pyracantha (*below*) has been achieved by shearing the plants regularly and fastening the branches to the wall surface with wire and staples

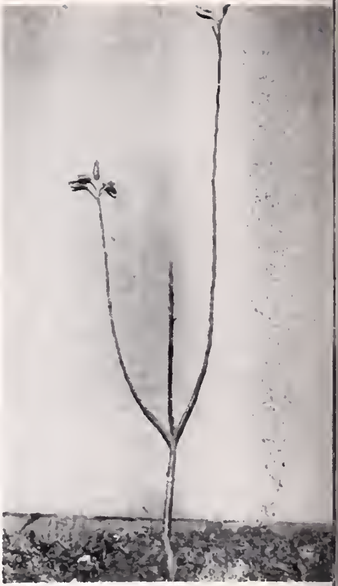


TRAINING AN ESPALIER FRUIT TREE

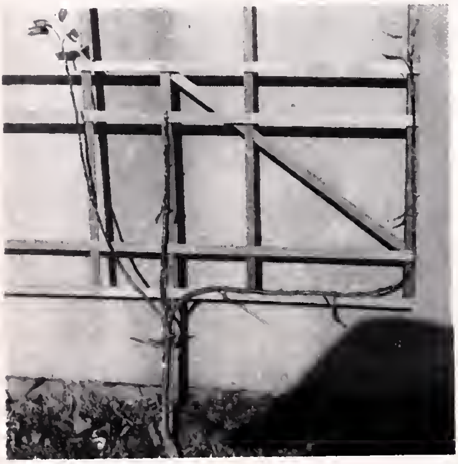


Gottscho-Schleisner

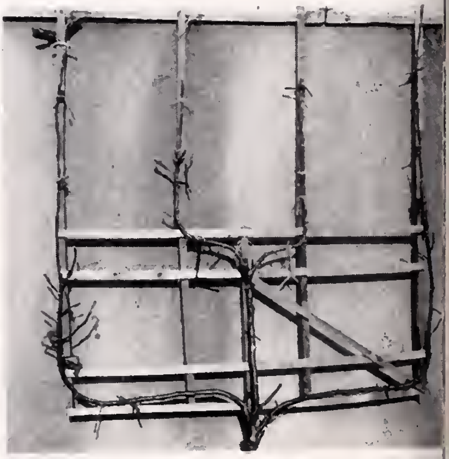
1. Select a young tree, grafted on dwarfing root stock, which has a pair of main branches a foot or so from the ground



2. To form a double U shaped espalier first cut off small branches and shorte center leader to force new side shoots



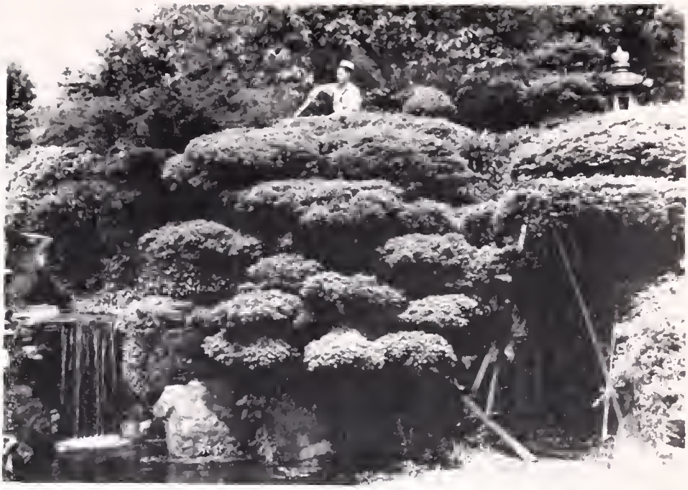
3. Build lattice to the full width of mature tree. Bend branches carefully and tie in position to start forming first U

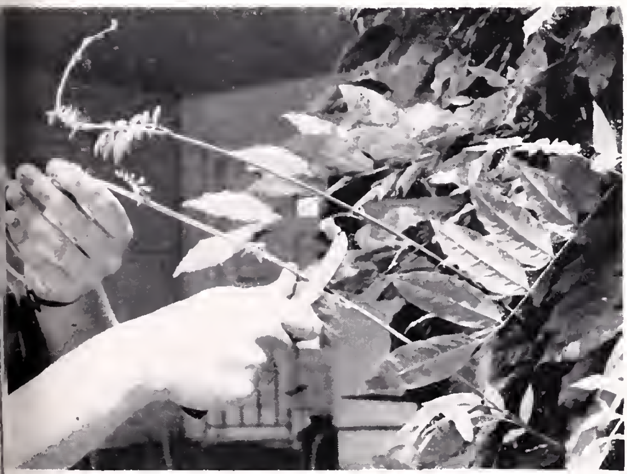


4. Double U is now completed after adde years of growth and the side spurs ha been pruned to a few inches in length

Pruning in the Japanese Manner

Individual branches and even the tops of Japanese maples are sheared into solid forms which create a unique pattern and play of light and shadow in the Japanese garden in Brooklyn Botanic Garden



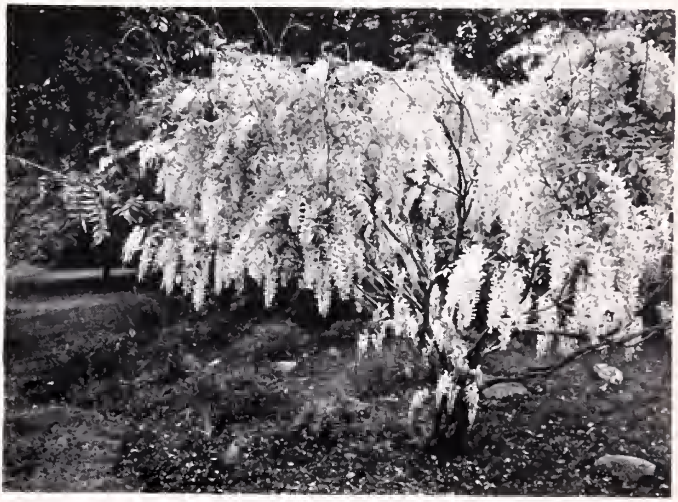


Pruning Wisteria

Repeated summer pruning back of new growth of wisteria is necessary to keep the plants from getting out of hand and to develop short side spurs which bear most of the flowers

Everett

Tree wisterias are pruned, in the beginning, to one or a few main stems which are staked until they are strong enough to stand alone. New shoots in spring and summer are constantly cut back to old wood to preserve the shape and size of top



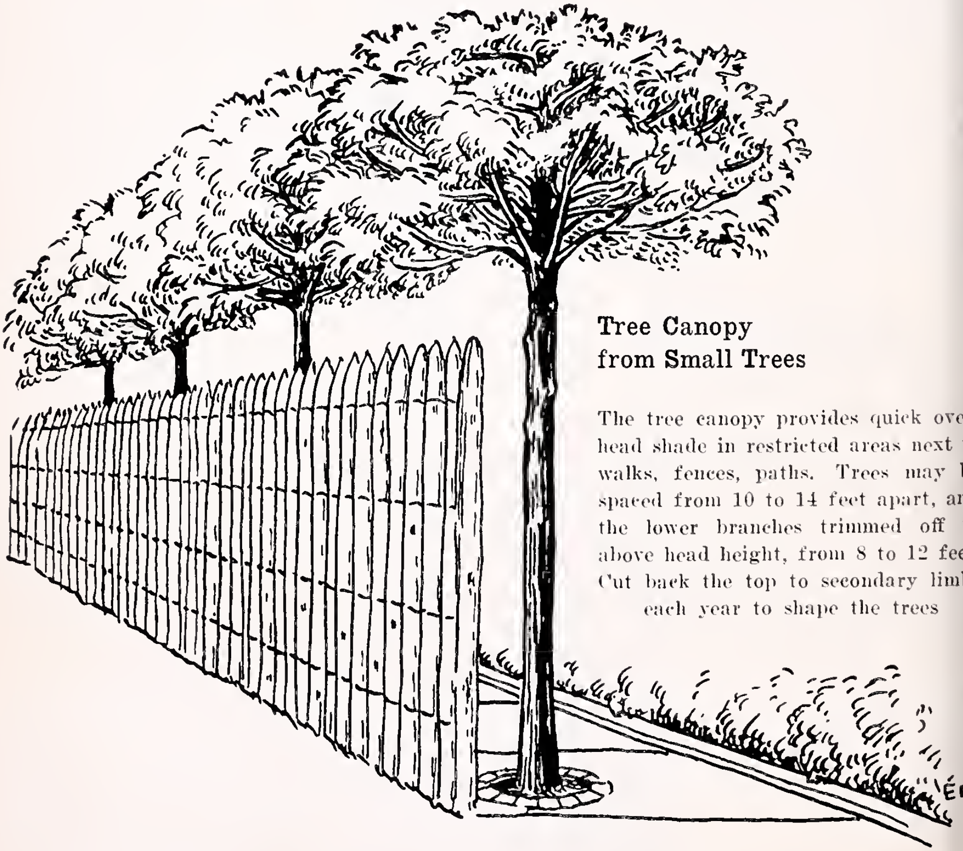
THE ARTISTRY OF PRUNING

WOODY plants have natural forms which vary tremendously, one kind from another. Among trees alone, trunk character may range from a tall, straight pole bearing a neat cluster of branches near the top to a short solid trunk giving rise to many upsurging, contorted branches of grotesque shapes.

Before selecting plants for one's grounds, therefore, some knowledge of the mature form of a tree, shrub or vine, whether evergreen or deciduous, is necessary in order to place a plant with suitable characteristics in a particular place in the home landscape.

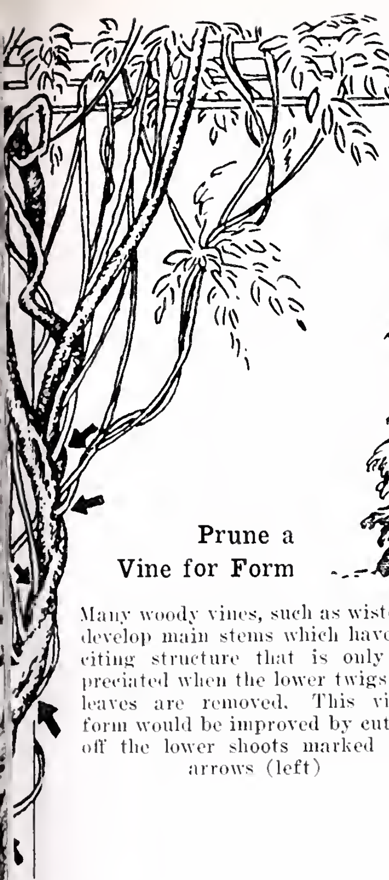
There are times when it is desirable, for the sake of landscape effect, to change the shape of a plant to a degree or to simplify its form through pruning. Several examples of this practice are presented on these pages, to illustrate how some special quality of a plant, or its overall shape, may be emphasized through pruning. Landscape architect, Douglas Baylis of San Francisco, contributed these ideas.

It is hoped that these suggestions may bring to life a new evaluation of the plants that surround you, and that through pruning, their hidden beauty will bring round-the-year enjoyment.



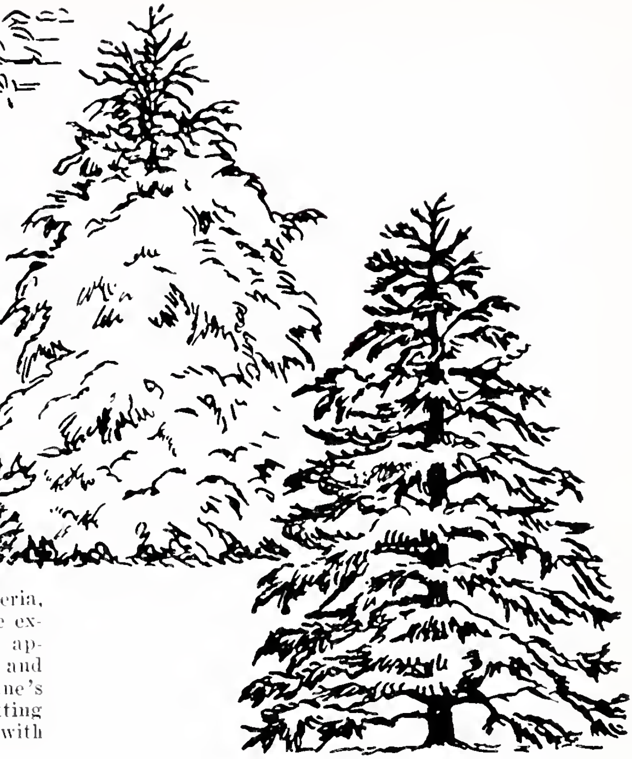
Tree Canopy from Small Trees

The tree canopy provides quick overhead shade in restricted areas next t walks, fences, paths. Trees may b spaced from 10 to 14 feet apart, an the lower branches trimmed off t above head height, from 8 to 12 feet Cut back the top to secondary limbs each year to shape the trees

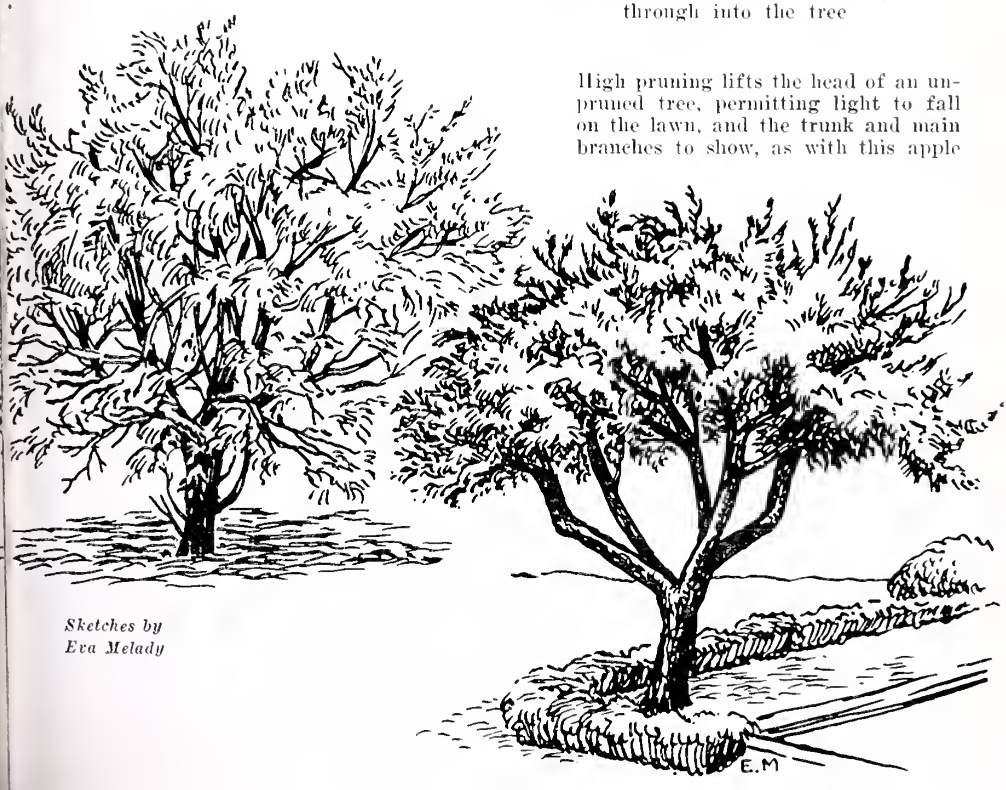


Prune a Vine for Form

Many woody vines, such as wisteria, develop main stems which have exciting structure that is only appreciated when the lower twigs and leaves are removed. This vine's form would be improved by cutting off the lower shoots marked with arrows (left)



Evergreens that have a "Christmas tree" form possess hidden branch and trunk beauty which can be discovered only by pruning away small branches to let the eye look through into the tree



High pruning lifts the head of an unpruned tree, permitting light to fall on the lawn, and the trunk and main branches to show, as with this apple

Sketches by
Eva Melady

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NEW SERIES
. 14 No. 4

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Editorial

PAUL F. FRESE, *Associate Editor*
and the Editorial Committee of the Brooklyn Botanic Garden

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Snow caps a column in the Dean Clay Osborne Memorial Garden

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Winter 1958-59

This 1958 year-end issue of **PLANTS & GARDENS** is our fourteenth annual digest. It seeks, as have its predecessors, to put before our readers condensed versions of what we feel are significantly interesting articles that have appeared in other journals during the past year. For the privilege of including these, we are indebted to the authors, and to the editors and publishers of the magazines or other sources from which they were selected. Space being limited, many fine articles, experiment station bulletins and books are listed by title only — with possibly a brief review.

Our usual Editorial Committee selection-system has given way this year to a system of nominations of "articles-of-the-year." Of those participating, members of the Garden Writers Association of America have been most active. We acknowledge their cooperation with special thanks. Apart from these nominations, Editor Frese and I must accept the responsibility for what appears in the pages that follow. The original articles included owe their inspiration to what goes on here in the Botanic Garden.

As this goes to press, Mrs. Avery and I have the very great privilege, through friends, of sailing southwestward across the Pacific Ocean to Australia and New Zealand. Our Island stops will include Tahiti, Samoa, and Fiji. I have accepted a technical assignment from our Research Department to collect samples of special soils in these far-distant places and, from these, our scientific investigators hope to isolate microscopic plants that secrete antibiotic substances. You will recall that one of the main objectives of our research program is to discover antibiotics that will prove effective in human cancer chemotherapy. Dr. Burkholder, Director of Research, has just returned from a similar but more exhaustive mission in Antarctica.

Why are we hopeful about this approach to mankind's ills? Because from the world's plant life have come many if not most of the substances known to conquer the ailments of man. The chemist may ultimately make such substances in his test tubes, but their original synthesis occurs in the seemingly humble life-mechanism of some species of plant.

My second challenge is to learn, I hope by observation, whether the use of ornamental plants has come into the lives of people in the South Pacific other than via western civilization. This may prove an impossible task for so short a time.

May the finest experiences of your life with plants be yours in 1959.

Sincerely,

George S. Avery

Director

STILL WATERS: SWAMP AND BOG

Betty Flanders Thomson

An excerpt from the book, *The Changing Face of New England*
(With supplementary photo)

A VENTURE into the depths of a bog on foot is a journey into a strange and unfamiliar world. The edge of the bog, where solid earth falls away, is often marked by a sort of moat several feet wide of more or less open water. This can probably be crossed on a fallen tree or jumped at a narrow place. Then comes a bit of hard going through a dense growth of trees and shrubs that will discourage the faint-hearted or delicately clad.

Coming out on the low, shrubby expanse of the "quaking bog" itself one has an inkling of how Alice felt in Wonderland. Standing still, you feel the "ground" undulate beneath your feet whenever someone walks past a few yards away. A gentle bouncing up and down sets the trees wobbling for several yards around. When one person wants to take a picture, everyone must stand still so that no footsteps will jiggle the camera. If you stand in one spot for several minutes, the water almost imperceptibly creeps over your feet and up your shins as the floating mat slowly settles. As you move around you learn to avoid anything that looks like a path and walk instead on the tops of the most solid-looking bushes. Nearly everyone steps on a thin place eventually and goes in above the knee. Happily, although the mat is flexible, it is tough, and the holes in it are small; so there is little danger of going all the way through to the lake bottom.

Animal life is rather sparse in a bog. Insects are abundant, and there may be small birds that live in the trees an brush. Deer may wander in to browse although one wonders how they manag on the loose-textured mat with their smal hooves. But compared to the teeming lif of a marsh, the bog is a quiet, vacan place.

Like other lakes, a bog lake fills fro the edges inward. Any open water tha remains in the center is bordered by loose network of floating plants, chiefl sedges and waterwillow, that spread b means of arching stems or stolons. Sinc the stems grow out in all directions, the become thoroughly intertwined to form strong, resilient mat of low-growing twig and branches. On top of this and in th interstices grows a luxuriant mass o bogmoss or sphagnum. Just a few fee back from the edge the floating mat ma be thick and strong enough to suppor the weight of several people, if they tak care where they step and do not all crow into one place.

On the tangled mat grows a characteristic assemblage of plants, including the bizarre sundews and pitcher plant that catch and digest insects. These the use to augment the nitrogen that i deficient in bog water and not otherwis available to small plants whose roots d not reach down through the water an peat to the underlying mineral soil.

Other plants found in bogs are evergree cranberries, leatherleaf, Labrador tea andromeda and the pale laurel. Thes and a few other unrelated plants tha grow with them all have in common th thick, leathery leaves that apparentl

© Betty Flanders Thomson, 1958. Reprinted by permission, The Macmillan Co., N. Y.

Paul M. Tilden

Tamarack-type bog (probably of glacial origin) in the Archer and Anna Huntington Wildlife Forest in the Adirondack Mountains in New York

serve to reduce evaporation of water. This would presumably adapt them to living in dry places. Now, a bog looks like anything but a dry place, and many attempts have been made to explain why drought-resistant plants should grow in standing water. One explanation offered is that a bog is "physiologically dry" because the water there contains so much dissolved matter that plant roots have difficulty absorbing water from it. This produces a result something like "burning" a lawn or garden with too much fertilizer. Another thought is that since bog plants grow in a shallow "soil," the size of their root systems and hence their ability to absorb water is limited by the nearness of standing water, just as much as though he plants were growing on rock. Another suggestion is that lack of water is a problem chiefly in winter when the bog may be frozen for long periods of time or when in any case the temperature around the roots is so low that they cannot take in water fast enough to replace what evaporates into the warmer air around the evergreen leaves.

Most of this is sheer armchair speculation. The little really experimental investigating that has been done suggests that the story may be discouragingly complex; and the relation of bog plants to bog conditions is not at present a popular field of research. On the other hand, it might conceivably turn out that bog plants are simply those that can make do in a cold, sterile habitat, whether wet or dry.

EARLY AMERICAN APPLES

Leo G. Klein

Reprinted from *The Cornell Plantations*, Autumn, 1958

WE ARE frequently asked why certain high quality old apple varieties are no longer available. The fact that varieties such as Roxbury Russet, "the Strawberry Apple" (Chenango), "the Snow Apple" (Fameuse), "the Sheepnose Apple" (Black Gilliflower) and many others have practically disappeared seems incredible to many older people who nostalgicly remember these "fine old varieties" from their youth.

While it is true that many of them, particularly King, Esopus Spitzenberg, Mother, Golden Russet, Swaar and Lady, were of exceptional quality, all had serious faults, which rendered them commercially unprofitable.

Before fruit growing became the highly specialized, competitive business it is today, most farms maintained a small orchard in which these apples were grown—mostly for home use with the surplus being sold at local farmers markets. From these small farm orchards evolved today's highly specialized fruit growing industry. By trial and error certain areas, for reasons of soil and climate, were found better suited to fruit production than others, and certain varieties proved to be more profitable than others. Eventually only a few areas and a relatively few varieties emerged as commercially profitable.

Modern commercial varieties must bear annually. This is now considered the most important single attribute of a good variety. Further, dessert varieties, such as McIntosh, Cortland and Delicious, must also be attractive, ship satisfactorily and not be exacting as to soil and climate, nor too subject to disease. High quality, while desirable, is not very important. It would seem, therefore, that the consumers are not as quality conscious as they migh be, otherwise certain low quality varietie never would have attained their presen commercial importance.

Currently, the most important commercial varieties in New York are McIntosh Rhode Island Greening, Cortland, Baldwin, Delicious (and its color sports) Golden Delicious, and Rome Beauty (an its color sports). Early McIntosh an Lodi are important early varieties. Monroe and Idared are two new varietie which are rapidly gaining commercia importance, Monroe as a replacement fo Baldwin and Idared as a late dessert typ which may replace Northern Spy.

One hundred years ago, the importan varieties in New York State were Earl Harvest, Red Astrachan, Twenty Ounc Rhode Island Greening, Baldwin, Northern Spy and Roxbury Russet. Eventually, Baldwin and Rhode Island Greenin became the two most important varietie in western New York and they accounte for over one-half of the total productio in this area. Rhode Island Greening i still popular but Baldwin is rapidly losing favor because of its uncertain cropping habit. Current production of Baldwin is largely from old trees and ver few new plantings are being made. Hence Baldwin soon will disappear from commercial production. Other old varietie still being planted in a limited way ar Twenty Ounce, Northern Spy an Wealthy.

Cornell University, at its New Yor State Experiment Station, Geneva, maintains an almost complete collection of ol apple varieties and some of these are use in breeding new varieties.

Old varieties in this collection, and reasons why they lost favor, follow.

The Cornell Plantations, Cornell University, Ithaca, N. Y.

Maiden Blush

Bright yellow and crimson coloring of this apple was not enough to give it lasting popularity

Photos by Paris Trail

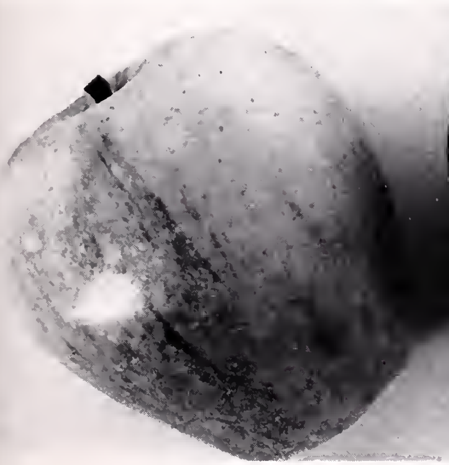
Black Gilliflower. The old "Sheepnose," easily recognized by its distinctive oblong-conic shape. While only of fair quality, it appeals to those who like a mild-flavored apple. Its distinctive dull dark color is not too attractive and no doubt contributed to its failure commercially.

Chenango. The "strawberry" apple. Fine-flavored, widely grown in home orchards. Its characteristic oblong-conic shape makes it easy to recognize. Its chief faults are extreme susceptibilty to bruising and poor keeping quality.

Early Harvest. The most popular early variety a century ago. Faults: small size, uneven ripening, it bruises easily, and has a very short storage life.

Esopus Spitzenberg. Still rates with the best for dessert quality. Trees lack vigor, are unproductive, and the fruit rarely reaches top quality.

Chenango or ''Strawberry Apple''



St. Lawrence has striped coloring

Fameuse (Snow Apple). Before the McIntosh era, Fameuse was one of the most highly valued table apples. Its attractive striped red color and its pure white flesh created a good market for it. McIntosh, probably a seedling of Fameuse, is superior to it in most respects, particularly in size and production.

Lady. Although very small, Lady is still one of the prettiest and best apples. Known for over 300 years, it still is being propagated in a limited way, mostly for decorative uses.

Maiden Blush. Its attractive coloring, yellow with a bright crimson cheek, made this one popular a century ago. Faults are its uneven ripening, short storage, which is not now important.

Mother. Still considered by many to be one of the finest dessert varieties. Trees are subject to winter injury, and are only fairly productive with a tendency toward biennial bearing.

Porter. A fine quality fall variety which has habit of uneven ripening. Flesh is extremely tender; suitable only fo home orchards.

Fameuse or Snow Apple

Pumpkin Sweet. Large yellow apple also known as "Pound Sweet." Too larg and coarse for dessert purposes; popula for culinary uses, particularly bakin Trees are subject to sunscald.

Roxbury Russet. One of several russe varieties, noted for their tender flesh an sprightly flavor. The color is blotchy, no attractive. One of the early attributes o the Russets was their ability to keep until spring in ordinary home cellar storages, which is not now important.

St. Lawrence. This distinctly stripe apple was once a popular fall variety Susceptible to scab, premature dropping and not very high in quality.

Seek-no-further. This once popula apple often is of mediocre qualit throughout most of New York State Does best in districts having a longe and warmer season than is usual in western New York.

Swaar. Early pomologists rated Swaa near the top in quality. Unfortunately the greenish yellow fruits, flecked wit russet, are not attractive. Has low productivity.

Tolman Sweet. At one time this variety was rated as the best winter swee apple. Its small size, greenish yello color, and the limited uses for sweet apples caused its loss of commercial popularity.

Tompkins King. At one time ranke fourth in commercial importance in Ne York State. Still present in many ol orchards. The quality is fine but yield are too low.

Wagener. Wagener's chief fault i lack of vigor of mature trees. The fruit are small and the trees short-lived. Despite these faults, Wagener is a good parent and is frequently used in breeding.

Yellow Newtown. Yellow Newtow lost favor throughout the northeast because it failed to thrive as well here as i other areas, particularly Oregon, Virginia, and, to some extent, the Hudso River Valley of New York.

STORY OF "SPANIARD'S BEARD"

James A. Foret

Reprinted from *Parks & Recreation*, October, 1958

THE rather odd looking growth a visitor observes hanging from trees in the Gulf Coast area is neither Spanish nor a true moss.

Spanish moss is believed to have derived its name from the early French settlers in Louisiana who called it "Spaniard's Beard." Botanically, Spanish moss is a member of the Pineapple family (Bromeliaceae). Its botanical name is *Tillandsia usneoides.* It is an epiphyte, meaning that it lives on the surface of other objects. It is not a parasitic plant.

Interestingly enough, it requires only a small limb, wire, fence rail or similar object to hang from in order to thrive, provided, of course, that the humidity of the air is sufficiently high to meet its requirements for water.

Nutrients for growth, which are the same as those required by other plants, are obtained from dust. The tiny hairs on each strand of moss sift dust particles from the air. In addition, small particles of bark, twigs and leaves from the trees in which the moss hangs are caught in the strands and gradually decompose, furnishing more nutrients.

Humidity and the frequency of rainfall appear to be the most critical factors limiting the natural occurrence of Spanish moss. It will thrive in areas which occasionally have temperatures of near zero degrees Fahrenheit, but only in swampy areas where high humidity prevails.

The size of the individual plant varies with its exposure to prevailing winds and the strength of the object supporting its weight. During periods of heavy rainfall, accompanied by high winds, the water accumulated in a plant will weigh enough to tear it loose or break its support. Without wind Spanish moss is

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strong enough to support itself while completely saturated with water.

The flowers of Spanish moss appear in spring and are rather inconspicuous and grey-tan in color. Seeds are primarily windborne. Upon landing in a crack in the bark of a tree, germination occurs as soon as sufficient moisture is present. Growth is slow during the first year, but is rather rapid in succeeding years. A single plant (several years old) may grow as much as 18 inches in one year.

Spanish moss has no particular preference as to species of tree on which it will grow, except that bark crevices of some trees afford a better place for germination, and the amount of light filtering through certain species of trees promotes faster growth. In checking the areas where Spanish moss thrives, one can find it growing on any and all species of trees and shrubs, having spread by seed and wind-blown pieces.

At one time, Spanish moss was harvested in large quantities and used to upholster furniture. Currently, it is also being used in foam rubber cushions to add resiliency. Locally, it was extensively used to make mattresses. To be prepared for these uses, the live Spanish moss must be piled in large mounds and watered frequently to stimulate decomposition of all tissues except those of the plant's vascular system (about the same diameter as horsehair). The "cured" moss is then cleaned and dried prior to movement to the gin for further cleaning and baling for shipment. In the live state, Spanish moss is used by commercial nurserymen to provide partial shade for lath houses and by fishermen to keep their catch of crabs and fish alive.

QUACK GRASS

Tests indicate that this weed can be toxic to crops

Thor Kommedahl

Reprinted from *Down to Earth*, Fall 1957

FEW people need to be told that quack grass is a troublesome weed in the garden. It is often said that the extensive network of rhizomes just under the soil surface robs soil of moisture and fertility.

Research in Europe and the United States (including work by the author—Editor), has shown that there may be substances produced by quack grass that are deleterious to the growth of other plants. Also, the rhizomes may harbor disease organisms that attack seedlings or cause root rots of some crop plants.

Since many have observed the difficulty in getting a good stand of alfalfa established on newly-plowed quack grass sod, experiments were begun to determine the possible causes of poor crop stands and growth in quack grass-infested soil.

Stands of alfalfa, barley, wheat, oats and flax were reduced and growth was less vigorous when these crops were planted on newly-plowed quack grass sod. Comparison was made with two adjacent plots, one of which was quack grass-infested and the other non-infested. Before planting, all rhizomes were removed from the infested plot to avoid active competition from living quack grass.

Alfalfa stands on quack-free soil were about double the stands on quack-infested land. The same relationship held for barley. Wheat and oats were affected less than barley. The average stand of wheat still averaged one-third less on quack

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plots. Oats averaged one-fourth less stand on the quack land. The average stand of three varieties of flax was 13 per cent less on the quack land which may not have been a significant reduction.

While differences in soil fertility could explain some of the yield differences, the probability that there were other explanations led to additional experiments.

When quack grass rhizomes are dried, ground to a powder, sterilized and mixed with soil in greenhouse pots, the soil becomes "poisonous" to alfalfa seedlings. The seeds that germinate produce stunted and chlorotic plants. The dry weight of one-month-old plants growing on soil containing ground rhizomes of quack grass was 35 per cent of that in control pots.

Water extracts from ground rhizomes, added daily to sterile soil in pots in which alfalfa was sown, resulted in only 40 per cent of the growth of the alfalfa in the check pots.

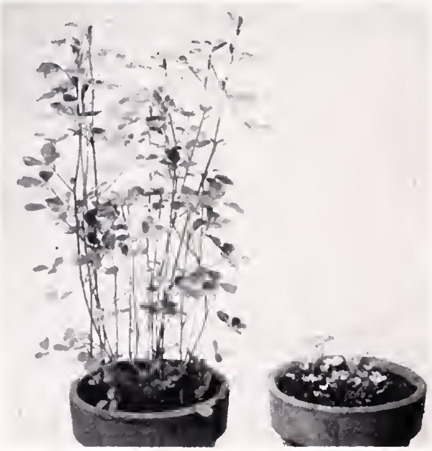
Water leached through pots of growing quack grass was poured onto pots of newly sown wheat. Only one-third as many seeds germinated in these pots as compared to identical pots watered with tap water. Moreover, the wheat roots were shriveled and often no secondary roots developed. For comparison, water leached through pots of oat plants had no effect on wheat, showing that oat residue, as an example, would not be deleterious to germinating wheat seed.

Germinating seeds of quack grass also produce substances which are toxic to wheat kernels. In tests, roots were produced on wheat but often shoots did not develop.

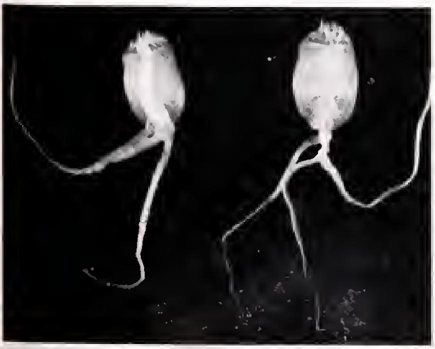
Quack rhizomes frequently were found to be infected with root-rotting fungi. These organisms apparently are carried along on the rhizomes without killing them. When some of these fungi were tested in the greenhouse for pathogenicity to cereal plants, several were found to be highly pathogenic. One fungus, isolated from quack grass rhizomes, caused seedling blight on wheat, oat, and barley seedlings resulting in more than 50 per cent loss in stand. In experiments combining this fungus with ground rhizomes, the percentage of blighted seedlings of barley was higher than that produced by the fungus alone.

How important these factors may be under field conditions is not known but it is expected that they may be as important, or more so, than the direct effect of quack grass infestations from a competitive standpoint in relation to soil moisture and soil nutrients.

Right. The effect of quack grass on growth of alfalfa. The pot on left is the control, the pot on right contains alfalfa growing in soil mixed with washed, ground up rhizomes of quack grass.



Below. ..Effect of leachate, obtained from growing quack grass, on germination of wheat grains. Note absence of a plumule in one of the grains that failed to emerge above soil level.



MASTERING THE ART OF HOEING

Archer P. Whallon

Reprinted from *Flower Grower,* May, 1958

EFFECTIVE hoeing is really a fine art—too long regarded as a task of drudgery. In all gardens, there is a need for hand hoeing. For such jobs there are different hoe designs, each one just right for some particular job.

Garden soil should never be allowed to get so hard, nor weeds so tall and tough, that hoeing becomes a hard job. The grief of the dilatory gardener is that "too little and too late" will have to be followed by "too much and too hard." One day's hoeing with the right tools at the right time will do more than several days' work a week or two too late.

The time to get a weed is not when it is 3 inches to a foot high, but when it is no more than an inch high—or even smaller. Then you will only have to handle half the weight of earth, exert half the energy and spend half the time you would if you delayed the hoeing job for a week. Moreover, if you do the job at the right time, you can use wide-cut, narrow-bladed hoes that will get over the ground easily and in a hurry.

These wide hoes are of several designs that differ in minor particulars, but the common feature is a wide, thin blade, about 1½ inches from edge to back and 6 to 10 inches wide. While this type of hoe has a wide blade, you can also strike into the row with the narrow end and take out weeds or thin the crop in a way that cannot be done with the common garden hoe, which has but one cutting edge.

There are some places where a wide-cutting hoe is not suitable, and a few places where it cannot be used at all. For many such jobs the ideal tool is the prong hoe. This has one or more pointed teeth opposite the hoe blade or cutting edge. There are several designs but the main point is to get one that is strong enough but not too heavy. This is the right tool for grass and sod pulling and for breaking hard ground. The sides of the tool in some cases can be ground sharp, making a four-sided implement—the wide sides for rapid weed eradication, the narrow end blade for planting and the prongs for grass and big weed pulling or soil breaking.

For rapid weed slaying, the push or scuffle hoe has no equal. Used at the right time and in the right way, about twice as much weed killing can be done with a push hoe as with a draw hoe of the same width.

There are two main types: one has two shanks or side arms, and the other has a simple central shank. It makes very little difference which is used. Possibly the two-shank or Dutch hoe is the more common; this is available in sizes from 4 to 6 inches wide. It is useful to have two of these hoes—a wide-blade one for rapid weed elimination and a narrow one for row weeding and thinning.

The single-shank push hoe is a strong tool for heavy service. Its only fault is that it may be unnecessarily thick and heavy for much garden work. It can be lightened some by cutting the corners of the blade off with an acetylene or electric torch. With these top corners cut off, the narrowed sides can be ground or filed sharp and used for row weeding. The hoe is now also good for digging out big weeds such as burdock, thistle and dock. One advantage of the push hoe is that it can reach under overhanging vines and shrubs.

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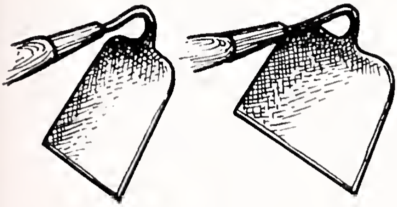
A substitute for a push hoe is known in town as a sidewalk scraper and among farmers as a barn floor scraper. The value of this tool can be increased by having the blade bent slightly at an angle to the handle. This is a good tool for taking out big weeds, throwing sods and stones from the garden and making cuts or holes in the ground for setting plants.

Quite recently some new pointed-blade designs of push hoes have been developed. While these enter the ground more easily than straight-blade hoes and are rapid weed killers, they are not as efficient for careful row weeding as the straight-blade designs.

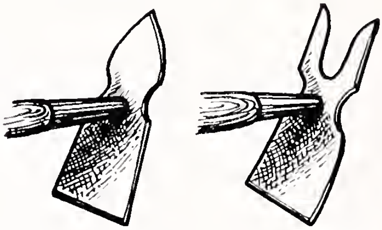
Many gardeners have yet to learn the elementary lesson of keeping their hoes sharp. The expression, "as dull as a hoe," certainly should become obsolete. Carry a good 10-inch flat file with you and, after an hour or two of work, take time to sharpen the hoe blade. Keeping the tool sharp is particularly desirable with all push hoes. File the top or beveled side of the hoe, making but a few light passes with the file on the underside to remove any turned edge or irregularity.

A dozen hoes for a dozen garden uses

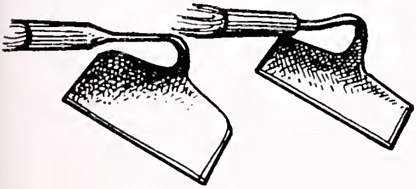
DRAWINGS FOR FLOWER GROWER BY ALLIANORA ROSSE



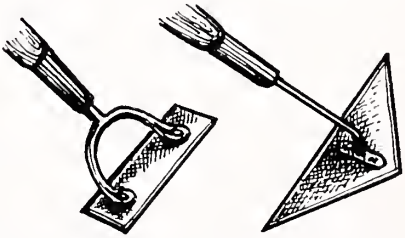
Nurseryman's (left) and floral hoes are for general hoeing and deep cultivation.



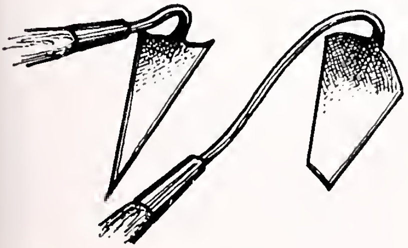
The versatile prong hoes can lift out a tuft of sod or heavy-rooted, large weeds.



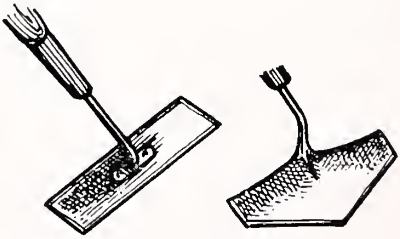
Beet (left) and onion hoes will cover a wide area. They are also light in weight.



Scuffle hoes like the Dutch (left) and orange grove can get under low branches.



Warren hoe (left) and soil-knife hoe are good for thinning and close cultivation.



Garden (left) and push-pull scuffle hoes have narrow as well as wide cutting edges.

DWARFING ADAPTS SNOWBALL FOR WIDER LANDSCAPE USE

Henry Teuscher

Condensed from the *American Nurseryman*, December 15, 1958

THE snowball bush, *Virburnum opulus roseum* or *V. opulus sterile*, is justly valued for its beauty when in flower. However, it is rather tall, easily reaching a height of 12 feet.

The propagator at Montreal Botanical Garden, Mr. Johansson, felt that if this handsome shrub could be dwarfed to keep it from growing taller than 4 to 6 feet, its usefulness in landscape planting would be much increased.

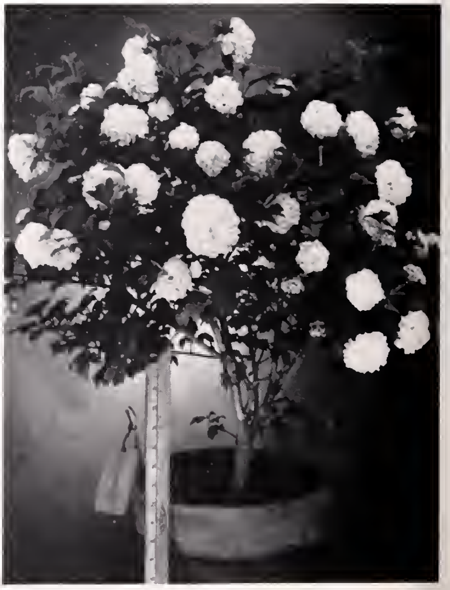
A suitable dwarfing stock was found to be the well-known *V. opulus nanum*, which does not grow much over 3 feet tall, and flowers only rarely. He rooted cuttings of the latter in July—they rooted surprisingly fast—and afterward whip grafted scions of *V. opulus roseum* onto them. This work was entirely successful. These plants now are four years old, are only 2½ feet high and flower freely. *V. opulus roseum* on its own roots would be well over twice that tall in four years.

There should be many uses for these handsome low shrubs, one of which is tubbing them so that they can be more readily displayed when in flower.

Mr. Johannsson concluded that the production was still too complicated to be commercially acceptable. To simplify it, he grafted the scions on cuttings of *V. opulus nanum* before the latter were rooted, inserting them for rooting into a bed of half perlite, half peat moss under interrupted mist. This experiment succeeded quite well. Rooting actually commenced two weeks after insertion in the bench, and at that time callusing of the union between stock and scion had commenced also. The whip graft was without interlocking tongue, but stock and scion were so tightly knit together at potting time that the raffia used to tie the parts to each other, could be removed. No grafting wax was employed. The scion was inserted rather high up on a long cutting. This was done on purpose, so that the union would always remain well above the soil surface. It must be expected that, if the scion is given a chance to make roots of its own, it will regain its original vigor and grow tall.

The cuttings of *V. opulus nanum* with their grafts of *V. opulus roseum* were potted after rooting—four to five weeks after insertion in the cutting bench—and were wintered in a coldframe. None were lost. In spring they were planted out.

This four-year-old *Viburnum opulus roseum*, grafted on a *V. opulus nanum* rootstock, flowers freely at a height of 2½ feet. An own-root plant would be twice that tall.



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WOODLAND VERSUS SHRUBLAND

Breeding bird studies in the Connecticut Arboretum Natural Area

William A. Niering

Reprinted from *The Connecticut Arboretum*, October, 1958

THE Connecticut Arboretum Natural Area, established in 1952, represents tracts that have been set aside as samples of our natural heritage, where plant and animal communities will be preserved as nearly as possible in an undisturbed condition. These natural areas offer excellent opportunities for long-range research.

During the springs of 1953 and 1955, breeding bird censuses of the area were taken to determine which species were nesting and their relative abundance in the various habitats. The portion of the Natural Area studied comprised 70 acres of woodland broken by a series of ledges, a small stream, a moist ravine, shrubby thickets, and semi-open fields. In this study, two major habitats have been distinguished—woodland and shrubland.

The woodland. In the upland forest, black, scarlet, red and white oaks predominate, with black birch and hemlock scattered or locally abundant. As a result of the 1938 hurricane, a dense vegetation of small trees and tall shrubs has developed. In many places mountain laurel forms a tall continuous shrubby layer. Wooded swamps are dominated by red maple and a shrub stratum of highbush blueberry, swamp azalea and sweet pepperbush.

The shrubland. This habitat has resulted from forest clearing followed by agricultural activity and subsequent abandonment. It varies from large, impenetrable patches of greenbrier interspersed with young trees to relatively open areas of grasses and goldenrod. Sumac and bayberry are dispersed through the more open situations. Thickets of greenbrier and grapevine, interspersed with scattered trees, line the stone rows.

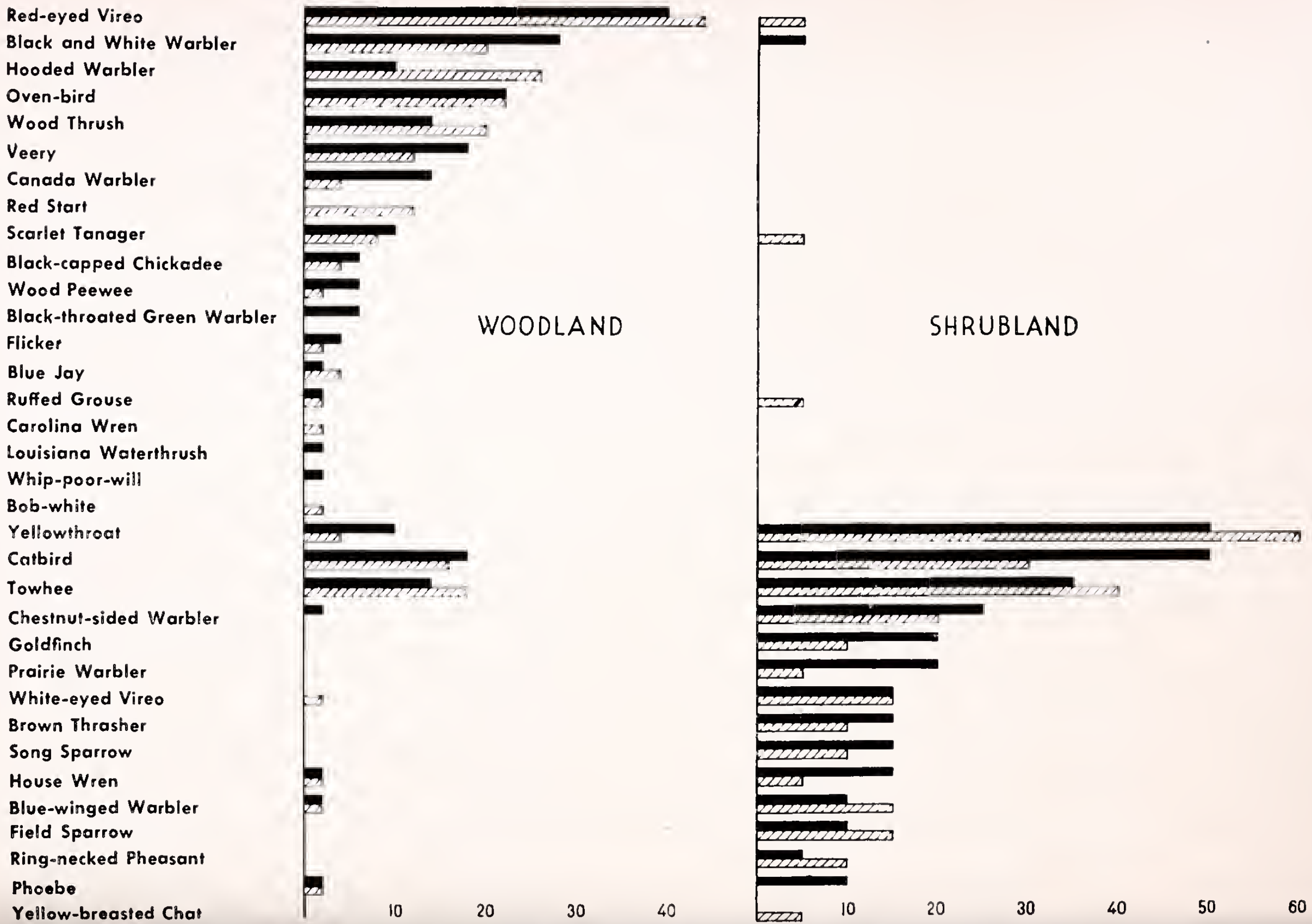
Woodland Nesting Birds

During both censuses, the five most characteristic birds in this habitat were the red-eyed vireo, black and white warbler, oven-bird, wood thrush and veery. Of these, the vireo, considered one of the most abundant throughout our deciduous forests, was nearly twice as numerous as the others.

During each census a total of 117 nesting pairs was recorded, or 234 pairs per 100 acres. This represents 2.3 pairs per acre. With respect to density of individual species, there was a pair of red-eyed vireos for about every 2.5 acres, whereas for the other more important species, the territory was about twice this size.

This particular woodland is extremely varied, with young second-growth forest over the ledgy area in contrast to a more mature forest in the ravine. The moisture gradient fluctuates from dry exposed rocky sites to extremely moist swamps. The distribution of the various species of birds is correlated with these differences. Along or near the ravine, the red-eyed vireo and ovenbird were most conspicuous, whereas the hooded and black and white warblers were usually found in the younger forest; the black-throated green warbler was restricted to the relatively mature hemlock stands along the ravine, since it prefers nesting in evergreens.

The Connecticut Arboretum Association, Connecticut College, New London, Conn.



Estimated number of breeding pairs per 100 acres for each of the two habitats. Solid

The Canada warbler and yellowthroat were found in the moist situations. However, the latter was restricted to the forest edge, as was the redstart. The catbird and towhee, usually not inhabitants of mature woods, were found around the large rock outcrops and ledges, where the vegetation had been seriously disturbed by the hurricane and where a dense shrubby cover has since developed.

With regard to nesting habits, species nesting on or near the ground are the oven-bird, veery, towhee, black and white warbler, Canada warbler and Louisiana waterthrush. In the open, shrubby cover, 4-8 feet above the ground, the catbird is conspicuous, while in the more shaded, sapling-tall shrub layer, the hooded warbler, wood thrush, redstart and frequently the red-eyed vireo are found nesting. Those nesting at a higher level include the scarlet tanager, wood peewee and occasionally the red-eyed vireo.

Shrubland Nesting Birds

In this habitat, comprising 20 acres, a total of 16 different nesting species was recorded, the three most important being the yellowthroat, catbird and towhee. Others, in order of their importance, include the chestnut-sided warbler, goldfinch, prairie warbler, white-eyed vireo, brown thrasher, song sparrow, house wren, blue-winged warbler, field sparrow, ring-necked pheasant, phoebe and yellow-breasted chat.

A total of 61 breeding pairs was recorded in 1953 and 52 in 1955, or 305 and 260 pairs per 100 acres respectively for the two censuses. Thus the density per acre ranged from 2.6 or 3.0 breeding pairs which was slightly higher than the 2.3 pairs found in the woodland. For the dominant nesting species, there was a pair of yellowthroats for about every two acres, whereas the acreage was slightly higher for the towhee and catbird.

In general, the birds were scattered at random wherever dense shrubby vegetation occurred. However, a few exceptions were found such as the chestnut-sided warbler, which was restricted exclusively to the dense greenbrier thickets with young trees near the margin of the woods. Another species, the blue-winged warbler, was typically found near the forest edge.

As in the woodland, diversity of feeding and nesting habits is conspicuous among the species of the more open areas. Although most of them feed to a great extent on insects, as in the case of the woodland birds, seeds and fruits also comprise an important part of the diet of such species as the catbird, field sparrow and goldfinch. The method of feeding also differs, the yellowthroat, towhee, blue-winged warbler, brown thrasher and ring-necked pheasant being primarily ground feeders, whereas the remainder are mostly foliage gleaners. The chestnut-sided warbler is also considered an aerial feeder, while the blue-winged warbler occasionally feeds on the trunks of trees, which may account in part for its affinity for the forest edge.

Those species which feed on or near the ground also tend to nest in this stratum. The others nest within the shrubbery, usually within 6 feet of the ground, although the goldfinch, house wren and catbird are frequently found at a higher level. Here as in the woodland this diversity in nesting and feeding tends to reduce competition among the various species.

Future Trends

Due to the instability of the vegetation in these two habitats, one can anticipate many changes in the future. As the tree canopy becomes more continuous in the woodland, much of the shrub cover may become shaded out. As a result, the abundance of the catbird and towhee will probably decrease and the number of woodland species increase. With the trend toward more hemlock, the black-throated green warbler and other species associated with evergreens may become more important in the area.

Although the entire Natural Area at the Arboretum has been seriously disturbed by man as well as by the forces of nature, future studies will reveal those changes which occur when only local natural forces are operative in modifying the vegetation and associated birdlife.

THE VIEW FROM THE ROAD

M. M. Graff

Condensed from *Popular Gardening,* February, 1958

THE houseproud Spaniard screens his house and courtyards behind a 10-foot wall, on the principle of "everything for the family, nothing for the stranger." While I'm not advocating such stony exclusion, still I think that in this country we err on the side of liberality, even to the point of forfeiting the family's right to privacy. For example, the front lawn exposed to the view of every passerby is useless to the owners, hardly better than a strip of public parkway without the advantage of public maintenance.

I realize that planting for complete privacy is often impossible on the small property; in fact, some village ordinances prohibit fences or even the use of obscuring shrubbery close to the street. However, the illusion of privacy can be achieved by every householder who combines a bit of taste with a feeling for the quality of a plant—that is, the ability to distinguish between plants that are flimsy, garish or unsubstantial, and those with an air of good breeding and permanence.

Fine-textured garden flowers at the front of a house not only lose the charm of intimacy, like a ruffled dressing table set in a public entrance hall, they also give away the whole show, leaving nothing for the family that isn't as readily available to the newsboy. Worse than that, they actually diminish the importance of the house they are supposed to enhance. Everyone can see that a stately tree gains nothing but embarrassment when its ankles are circled with a lingerie ruffle of sweet alyssum; in exactly the same way, a house with cottagey flowers up front is reduced to cottage status.

Planting on the street side of the house, then, should convey a feeling of restraint and dignity; yet it must have enough interest to serve as an appetizer, a promise of more lavish delights reserved for the family and their friends in the seclusion of the outdoor living space.

That sounds like a tough assignment, doesn't it? It is all of that and it may take some study and experiment to strike the vital balance between a shrieking dissonance of magenta and rust-colored azaleas, and the weary banalities: yews that grow brown and hollow in the middle; rhododendrons gone leggy from being cultivated instead of mulched; sponge-rubber barberry; and those much-planted blue-gray prickly trees—*Chamaecyparis,* I think they are—that look like lollipops, balls and pyramids when the over-zealous gardener gets done with them.

Two ways to capture interest without sacrificing restraint are to use unhackneyed plant materials, and to use familiar plants in uncommon ways.

To be specific, the firethorn, *Pyracantha coccinea* and its hardier variety *lalandi,* have the merit of neat, practically evergreen foliage and of doing well in partial shade. Their natural habit, however, is too tall and whippy for a foundation planting. Yet, this shrub makes a most distinguished "vine" when trained against a wall as an irregular espalier.

It takes some strong-minded pruning to keep the pyracantha compact and neatly patterned.

As soon as the buds are readily visible, I cut off the outer ends of flowering branches just short of the flowers. The berries will then be spotlighted at the tips of the branches without any inter-

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vening foliage. Then, with a ruthless hand, I prune the non-fruiting wood, to eliminate the bulgy places that contradict the flatness of the wall, to open out some interesting voids, to display the shiny red-brown trunks and the play of leaf shadow, and to let the bricks assert their sturdy texture.

The hardy orange, *Poncirus trifoliata,* is as decorative as it is unusual. Any reference book will tell you that the tree, usually grown as a shrub, isn't hardy north of Washington, D. C.; my tree has not read the books and continues to flourish in Long Island, serenely unaware that it ought to be dead. In May of 1956, after a cruelly long, cold winter, it bore the most generous display of flowers in all its 14 years.

I must declare at once that my tree's round head is pure artifice, achieved at the price of many a painful jab from 4-inch spines, as sharp as ice picks. I quite agree that a clipped tree is a monstrosity in a "naturalistic" landscape, yet I think that a bit of formality is not out of place beside a house, in itself an artificial form, disciplined in line and proportion.

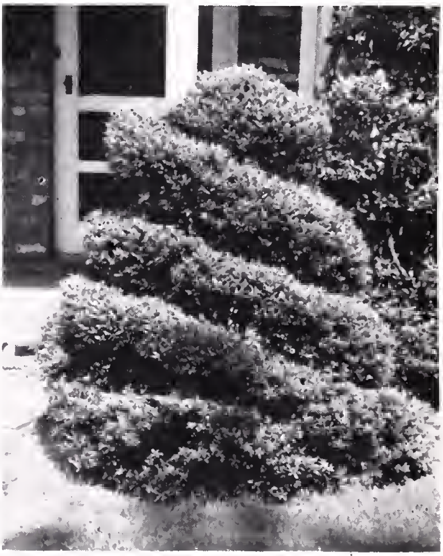
In a line of exclamation points, there is no real emphasis. Compare !!!!!!!!!! with ——————! and you'll recognize one of the commonest faults of foundation planting: the use of nothing but accents; pointed forms, with never a horizontal line to lend variety and repose. To make a restful space under the living room windows, I have a line of three box-leaf hollies (*Ilex crenata convexa*), broad and low, and closely trimmed to keep them solid, billowy, but patternless.

At the end of this disarming stretch, BINGO! a piece of spiral topiary takes the eye and marks the focal point, the front door. This corkscrew in *Ilex crenata microphylla* is primarily the invention of our postman, who, while resting in the shade of the porch one simmering day while he drank his lemonade, commented idly on the shape of the bush at his elbow. Sure enough, it did have a sort of natural swirl when I came to look at it. I've worked at accentuating this tendency for three or four years. It is particularly effective when the pale new growth highlights the curves and contrasts strongly with the defining shadows between them.

Trimmed Plants Add Dignity to the Front of the House

Right. Spiral-trimmed *Ilex crenata microphylla* accents the doorway.

Below. Hardy orange blooms sweetly in April, produces golf-ball size fruit in fall.



Saving an Ancient Beech

Dozens of valuable trees, like this beech on the former Jeremiah Milbank estate in Connecticut, were protected against damage to their trunks and roots from bulldozers by barricades.

PROTECTING TREES FROM CONSTRUCTION DAMAGE

Harold O. Perkins

Reprinted from *The Connecticut Arborist*, December, 1958

(With supplementary photos)

MATURE trees, well placed, add hundreds or even thousands of dollars to the value of a house. Trees at the west and south side of a building offer shade that is a natural air conditioner, and this adds greatly to the summer comfort of the house and grounds. Trees are the most important plant form to provide the home with a well-landscaped, livable appearance.

Unfortunately, many present-day building and grading techniques use large equipment that finds trees a "nuisance." Trees are uprooted, badly scarred, or an excess of fill is heaped about them.

Modern Dinosaurs

Bulldozers and power shovels change the face of the earth at a rapid rate and have an "appetite" for trees of all sizes that would put a pre-historic dinosaur to shame. When large trees are removed, some building contractors tell the home owners that "you can always plant new trees." They fail to add that you can also wait forty years for your new trees to reach the size of those that all too often are ruthlessly destroyed. Trees do slow down the operations of trucks and earth moving equipment, but all too often a contractor in trying to save a nickle's worth of time will destroy a dollar's worth of tree.

There is another side of the tree picture that should be recognized. Some home owners place a false value on trees. They

Published by the Connecticut Tree Protective Association, University of Connecticut, Storrs.

A Priceless Tree Preserved

The entrance to this apartment house is now sheltered and completely landscaped with this one beech tree which has a trunk circumference of 20 feet. J. J. Levison was landscape architect.

Frese

want to save every single tree. They fail to realize that there are weed trees as well as quality trees. Poor trees should be removed so that the better trees will grow to advantage. This selective cutting provides for a better circulation of air and permits necessary light to reach lawn areas and shrub plantings near the house. Trees are best located when at least 30 feet distant from the house. If they are too close they are more likely to be damaged during construction and they might damage the house during a storm. It is much less costly to remove such trees before rather than after a house is constructed.

In protecting trees during construction, there are five danger factors that bear watching. These are excess fill, excess cut, compacting of soil, change of water table, and barking of trees.

Tree Wells Only a Partial Answer

A fill of soil around a tree may suffocate it. Roots near the surface of the soil take in a small but important amount of oxygen and when an excess of soil is placed over them the tree suffers and a year or two after the house is finished, the tree is likely to die. Some builders place a stone wall around the trunk before the fill is made. This does some good, but only rarely is it enough to save the tree. What is needed is a layer of coarse gravel extending from the trunk to a point 10 feet beyond the spread of the outermost branches. This should be applied before any soil fill is added and is best topped with old hay or leaf mold. The layer of coarse gravel with its large air spaces will allow air to circulate from the tree well to all of the surface roots. The soil fill that is used should be a sandy loam rather than a heavy clay. Some trees such as oak and willow can withstand more fill than beech or hemlock.

Only a few inches of soil can be removed near a tree without damaging the plant. A mulch of leaf mold or wet peat moss will alleviate the drying effect. Compaction of soil by heavy equipment also results in suffocation. Some tree experts aerate the soil with a compressor, after construction is completed, to help restore the natural condition.

Digging basements, trenches for footings, ditches for drainage, water pipes, and foundations for driveways changes the water table, especially on poorly drained properties. Silver birch, older swamp maples and other native trees are sensitive to changes in natural conditions and so can be severely damaged. Specimens that have been surrounded by many trees and then are suddenly exposed by heavy cutting to bright sun, strong wind and a change in the water table may die within a year.

Tree Guards

Valuable trees should be protected by strong posts and heavy fencing during construction. If the lower branches are considered desirable, they can be tied up to the central leader. If trunks or large branches are scarred, the wound should be shaped into an ellipse that parallels the main lines of the trunk. Wounds heal only from the sides and the callus growth follows a streamline pattern. Orange shellac should be applied to a wound immediately and is especially valuable when placed over the cambium layer at the edge of the wound. A water-emulsified asphalt or special tree paint should be applied to the entire wound. Renewal applications of the tree paint should be made every two years.

Fifty years of tree growth can be thoughtlessly destroyed or mutilated in a few moments by the careless operators of heavy equipment.

Trees, "the silent citizens of good neighborhoods," will benefit from protective measures during building operations. And you in turn will benefit by more comfortable and pleasurable living.

PLANTING FOR SAFETY ON STATE TURNPIKES*

IN planning the location for plants along the Connecticut turnpike, the basic control factor was traffic safety.

Since the speed of travel on highways has increased, it is necessary to remove potential obstacles to a safer distance from the possible paths of vehicles travelling out of control. For this reason, in stretches where no barrier fence was planned, a distance of 30 feet was maintained, in the turnpike planting, from the edge of the pavement to any deciduous or evergreen trees which ultimately attain heights of from 35 to 90 feet. Deciduous trees of this size included maple, oak, ash, beech, planetree, linden, the larger species of birch, and evergreen trees including pine, hemlock, spruce, larch and red cedar.

Trees of small sizes, attaining heights from 15 to 25 feet, can be expected to yield under the impact of a colliding vehicle and can thus be located nearer to the roadway without becoming potentially dangerous obstacles. Where there is no barrier fence, therefore, hawthorn, dogwood, crabapple, serviceberry, hop-hornbeam, sourwood, small species of birch and maple, were located not less than 15 feet from the shoulder of the roadway. The same minimum distance of 15 feet from the shoulder applied to the location of shrubs where no barrier fence existed. Where such a fence was provided to confine vehicles to the roadway, plantings of all kinds were located as close as 8 feet from the edge of the shoulder.

The orientation of the road alignment, which is predominantly east-west in the case of the turnpike, also influenced the plant materials' setback distance. The minimum distance from pavement to large

*Reprints of this article and others on highway planting are available from the American Association of Nurserymen, 10 East 43 St., New York 17, N. Y.

trees was increased on the south side of the roadway, where shadows from the trees might create areas of ice on the pavement. Evergreen trees, which cast shadows in winter as well as in summer, required a greater setback distance than deciduous trees. Dense planting of shrubs and small trees, which might cause shadows and icing, were likewise located farther from the roadway on the south side. Special attention was given to the possibility of shadowing the roadway by trees planted at the tops of slopes.

Sight Lines

The planning of adequate sight lines for safe passing and stopping was another major consideration. It was necessary to keep open views across the inside of any curve in the highway. The minimum length of this view, in the case of an expressway designed for a speed of 60 miles an hour, was 500 feet. The minimum offset distance needed to keep a tree from blocking this sight line increased with the increase in the degree of the curve.

Intersections, also, required unobstructed sight lines. Where no traffic lights were located at intersections of turnpike ramps with local roads, a sight line distance of 150 to 200 feet was maintained. At points where exit ramps leave the turnpike, mass plantings of shrubs, with some large and some small trees, were so located as to direct the attention of motorists to the diversion of traffic. These plantings will be tall enough to emphasize the point of separation, yet low enough not to constitute a sight line obstacle. At points where entrance ramps join the turnpike, the only plantings allowed were low-growing shrubs so that unobstructed views between converging vehicles were insured for a distance of 500 to 600 feet from the intersection.

Shadows Eliminated

Shadows falling on the highway pavement from roadside planting may create problems for the motoring public, other than icing in winter. It was necessary to consider these possibilities when plantings were provided for the turnpike. Care was used to avoid placing trees or shrubs in such locations that their shadows might create illusions.

Another effect which the consultant attempted to eliminate was that caused by alternate patches of shadowed and sunlit pavement, a shutter-like arrangement of light and dark.

Along high-speed turnpikes, landscape plantings must be set back a safe distance, as pictured here, so as not to be dangerous obstacles to cars out of control.

Royal Gold is a new yellow trumpet-type lily

LILY PROGRESS

Joan Lee Faust

Condensed from *The New York Times,* August 3, 1958

JAN de Graaff is a pioneer in lily work, being the first person to make a systematic exploration of the entire lily genus. There are approximately 80 species in the lily clan, and Jan de Graaff is studying them all with a view to their genetic potential.

Heretofore most species have been vegetatively propagated year after year with no effort being made to destroy the rogues (poorer examples of individuals within a certain species). Mr. de Graaff grows large numbers of many species. Plants are watched carefully and selected for the finest examples of each species. These chosen lilies are then propagated as superior types. The types are again selected and intercrossed with others of the same species until a virus-free strain is established. These lilies are true species, not hybrids, but their quality is superior to other plants of the same species.

The work does not stop there. The nursery plantings are watched for possible mutations. These might appear as color variants or as evidence of certain qualities that make one lily different from its parents. Some mutants, if interesting and of value, are then selected and crossed again within the species (intra-specific cross). From these selections new types have been introduced. Golden Gleam and Yellow Bunting are examples of color variants of *Lilium pumilum.*

A major goal of this program is to raise hardy, disease-resistant strains of garden lilies that will have great tolerance to varying soil and climatic condi-

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tions, and to produce lilies with as large a variety of colors, types and seasons of flowering as possible.

Research of this kind has brought about great things in the lily world. From *L. amabile* and *L. davidi* and related lilies have come the gay Fiesta Hybrids. These have nodding reflexed flowers in a wide color range. From the old, upright hybrids of the Hollandicum type lily (*L. umbellatum*) comes a robust group of seedlings called the Rainbow Strain.

The Olympic Hybrids have revolutionized the gardener's conception of trumpet lilies. The plants are especially tall, some 7 feet, and the large trumpet flowers are borne in bold pyramid arrangement. These have brought great fame to the Oregon Bulb Farms.

Outstanding variants within the Olympic Hybrids also have been selected and named, such as Green Dragon, Black Dragon, as well as the Pink Strain. A by-product of this work has been the isolation of a yellow regal lily, Royal Gold.

Great things also are being done with *L. auratum,* or Gold Band lily, by crossing it with *L. speciosum.* This original cross was made in the nineteenth century and was repeated recently by an Australian grower, giving rise to the beautiful lily Jillian Wallace.

Edgar L. Kline, lily hybridist in Oregon, has been working with new color lines in his breeding work. Along the way he sees a few trends taking shape.

"Years ago gardeners liked to grow the deep dark-colored lilies," Mr. Kline says. "Now they seem to prefer the pastel shades. White, especially, is gaining in popularity."

For a long time orange had been a very popular color but there is now a trend away from that shade, too. "The oranges are on the way out," he says. "Maybe orange-colored lilies remind gardeners of the old-fashioned tiger lily. Another reason is that orange is a hard color to combine with other border perennials."

There definitely is a trend away from true species lilies, too. These rarer, more capricious lilies are grown mostly by the hobbyists or lily collectors. The average home gardener wants a lily that, with reasonable care, will give a colorful show of flowers. Hybrid lilies are more easily grown by the average gardener. These

Golden Gleam is a form of *L. pumilum*

Fiesta Hybrids include many rich colors

Oregon Bulb Farms

are bred from selected parents to bring out the best qualities in color, form, vigor and disease resistance.

Lily hybridizing is a slow process. It takes from three to seven years to determine if you have anything from a cross, and then six to seven years or even twenty to build up enough stock so that it can be marketed.

It is faster to raise lilies from seed, but the seed does not always come true. If a lily can be bred to produce fairly uniform plants from seed this is called a strain. Many of the finest garden lilies available now are hybrid strains.

With a strain, however, the nurseryman has the responsibility of watching over the plants to be sure that they remain true to the strain. The strain is continually renewed by breeding back into it strong "blood lines."

Height is a quality that lily hybridists must now consider. So many of the lily strains and hybrids have such tremendous vigor that they grow to ungainly heights. "Breeders are going to have to breed down," says Mr. Kline. One of his new "bred down" lilies is called Cameo Hybrid which is about 3 feet tall, having flowers of a lovely pink shade. These new hybrids were developed from crosses of *Lilium auratum platyphyllum* (and its variants) with forms of *L. japonicum*. The flowers are bowl-shaped, similar to *L. auratum platyphyllum* in form. A white Cameo is also available.

LIGHT TREATMENT IN THE PROPAGATION OF WOODY PLANTS

Sidney Waxman

Reprinted from *The Garden Journal*, July-August, 1958

THE effect of daylength, especially on the flowering of many herbaceous plants, is now well known. For example, by controlling the number of hours of light per day, many herbaceous plants, such as chrysanthemums, can either be forced to flower or be prevented from flowering, depending on how the particular species responds. Some species, referred to as long-day plants, flower only when the days are longer than a certain number of hours; other so-called short-day plants flower when the days are shorter than a certain number of hours.

Now, regarding the effect of photoperiod (length of day) on trees and shrubs, we are not as much concerned with flowering as we are with overall growth.

When trees are growing under natural conditions, using the flowering dogwood as an example, new growth starts in spring when temperatures become high enough. Active growth occurs in two spurts during June and July when the days are fairly long and temperatures high. However, during August and early September, when temperatures and moisture conditions are still ideal for further growth, the trees become dormant, that is they do not produce any more leaves nor do they grow in height.

If such woody plants are taken into the greenhouse during the summer and maintained there throughout the fall and winter, they stop growing at approximately the same time as identical species outdoors.

What is it then that causes the dogwood to stop its growth? An obviou factor other than temperature, which varies according to the time of year, is th length of day.

Published by the New York Botanical Garden, Bronx Park, N. Y.

On June 21, the longest day of the year, in the latitude of New York, there are about sixteen and a half hours of sunlight. On December 21, the shortest day of the year, we receive only ten and a half hours of light.

Thus, when the days are longest, growth is most active and, as the days become shorter, growth stops.

The writer carried out experiments during the past four years to determine the effect of daylength on the growth of trees and shrubs. To eliminate the effects that photosynthesis may have had, all groups received the same amount of sunlight, accomplished by exposing them from 8:30 a.m. to 4:30 p.m. At 4:30 p.m. each group was covered with black cloth until 8:30 the following morning. It was during this shaded period that the various groups were illuminated with incandescent light of low intensity for different periods of time to provide long, intermediate, and short photoperiods.

The results showed conclusively that it is actually the time span of light and of dark that regulates the growth of many woody plants, not the amount of sunshine.

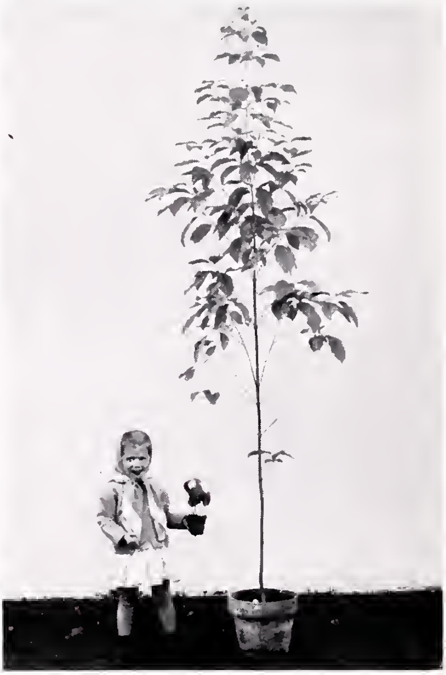
Plants exposed to short photoperiods of 13 hours or less were forced into a premature state of dormancy. Long photoperiods of 15 hours or more tended to keep the plants actively growing and correspondingly delayed the onset of dormancy. When the plants were subjected to long photoperiods in the greenhouse, the need for the winter rest period was eliminated. Flowering dogwoods were maintained in this "active" state for over 20 months, by which time they were too tall to be illuminated.

Another interesting example is Japanese maple which, under natural conditions, is slow-growing. However, when placed under continuous light, it grew steadily at the fantastic rate of one-half inch per day.

Daylength also affects the rooting of cuttings. Cuttings subjected to long photoperiods in a mist-propagation bench produced about twice as many roots per cutting as those given short photoperiods. Increased rooting by long photoperiods occurred on cuttings of *Rhododendron mucronulatum*, pink-flowering dogwood, magnolia and weigela.

The use of photoperiod treatment on cuttings has several advantages since normally, on cuttings of many woody plants, including dogwood, no further vegetative growth develops after the cutting is removed from the parent plant until the following season, after the dormancy of the buds has been broken.

Cuttings of pink-flowering dogwood, given long photoperiods only when in the propagation bench, unexpectedly produced an additional year's growth three weeks following their removal from the photoperiod treatment. Further, by subjecting stock plants to long photoperiods, they remained in active growth, serving as a continuous source of cutting material.



One-year-old cuttings of flowering dogwood. Both of the plants (*right*) were 6-inch cuttings rooted in August. The small plant was grown under normal day-length; the tall plant received 18 hours of light each day.

Although it has been implied that the length of the light period is of major importance in controlling growth, the controlling factor seems to be the length of the longest continuous *dark* period and not the total length of either the light or the dark period in any twenty-four hour cycle.

It is known that one criterion of a genuine photoperiodic phenomenon is the duplication of a "long day" effect by the interruption of the long dark period of a "short day" with a short period of light. This short interruption, frequently termed a "light-break," effectively breaks the long dark period into two short dark periods and, thereby, produces the "long day" response.

The "light-break" treatment has been tried and found successful. Plants exposed to eight hours of light plus an additional two-hour "light-break" during the middle of the night remained in active growth, whereas those plants exposed daily to an uninterrupted ten hours of light were forced into a state of dormancy. Although the "light-break" treatment was effective, the rate of growth did not approach that attained under the continuous light.

A VACATION PLANT–SITTER

Mrs. Woodbury S. Ober

Reprinted from the *Bulletin of The Garden Club of America,* January, 1958

ALL of us know how hard it is to take a vacation, leaving behind beloved plants with no assurance that they will be properly tended during our absence. Now science has given us a plant-sitter of apparent reliability whose "wages" are, astonishingly enough, nominal.

I can best describe our new plant-sitter by telling the experience of a couple who went unexpectedly on business to Europe for five weeks. The lady of the house had read of polyethylene. She knew that this plastic material checks loss of water, yet permits a change of air. So, desperate but hopeful, she hied herself to the nearest store and bought a quantity of it.

The day before taking off for foreign climes she watered each plant heavily from the bottom and then wrapped polyethylene completely around each (pot and all), making a tent over the plant and securing it tightly at the base with a rubber band. She put the plants on window sills where they would get some sun. [Too much sun can be harmful—Ed.]

She went abroad with faith in science, and five weeks later returned to find her "arboretum" flourishing. By observing her wrapped plants, it appeared that the polyethylene enclosure forced the water to act like dew, gathering moisture to its inner surface during the day, and spilled back the mist at night. Unwrapped, none of the plants seemed the worse for wear.

House plant bagged in polyethylene needs no watering for several weeks

Eva Melady

Garden Club of America, 15 E. 58th St., New York 22, N. Y.

A CONVENIENT NEW METHOD OF SOIL FUMIGATION

John Harvey, Jr.

Reprinted from the *Bulletin of the American Iris Society*

IRIS growers are becoming increasingly aware of the benefits of treating soil before planting so as to kill harmful organisms in the soil. Some compounds kill fungi which cause certain iris diseases, others kill nematodes, and still others kill weeds. The most useful compounds are those which kill all kinds of harmful pests in the soil before the crop is planted. These are known as soil fumigants.

Some iris growers have used methyl bromide as a soil fumigant to control leaf scorch. According to reports, iris in the treated beds were wonderful as to size, color, growth and rhizome increase. No nematodes or rot were detected after treatment.

Fumigation of soil with methyl bromide presents certain difficulties, however. Methyl bromide is a gas sold as a liquid in small pressurized cans. The area to be treated must be covered with a gas-tight cover, the edges of which are joined to the ground with gas-tight seals. Special equipment is required for releasing the gas from the cans and distributing it properly under the cover. In densely populated areas, there is always the danger that a child or pet might crawl under the cover and be killed by the poisonous fumes. The hazard and the equipment required limit the use of methyl bromide for the home gardener.

A new chemical, sodium methyldithiocarbamate,* presents both home and commercial growers with a safe, easily applied soil fumigation treatment. The home gardener dilutes the required amount of the compound with water and distributes it uniformly with a sprinkling can over a measured 100 sq. ft. area. The area is sprinkled immediately with enough additional water to wet the surface thoroughly (about 15 to 20 gallons). In damp soil the chemical breaks down to a gas which diffuses through the soil, killing weeds and harmful fungi and nematodes. The water which is applied immediately after the treatment carries the chemical into the soil and also acts as the seal which prevents escape of the gas into the atmosphere.

About one week after treatment the soil is cultivated to allow any remaining vapors to dissipate slowly. Seven to ten days later the soil is ready for planting. On larger areas the chemical may be applied by hose proportioner or garden sprinkler. Complete directions are given on the labels of the containers. As usual with any garden chemicals, the manufacturer's recommendations and warnings should be read and followed carefully.

When I moved my complete collection of iris from its old location to my new home, the beds were prepared carefully early in July. I turned over the soil and mixed in lime, fertilizer, and mushroom compost in the required amounts. The soil was well worked, slightly damp, and in fine condition for planting. For each 100 sq. ft. of bed I used 3 pints of VPM Soil Fumigant, which was applied by the sprinkling can method. Two weeks later I began to plant.

The most noticeable result has been the control of weeds. The soil was full of

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*Sodium methyldithiocarbamate is sold as VPM Soil Fumigant by E. I. du Pont de Nemours and Co., and as Vapam by the Stauffer Chemical Co. The products should be available from local garden supply stores.

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TREATING SOIL WITH WATER SOLUBLE FUMIGANT

One treatment prior to planting controls—

Annual and perennial weeds and germinating weed seeds of both grassy and broadleaf species.

Soil fungi including *Pythium* and *Rhizoctonia* which cause seed decay and damping off as well as those which cause root rots and vascular diseases.

Nematodes, including both gall-forming and free-living types.

Certain soil insects and other pests such as the garden centipede (Symphylids).

How to treat soil with soil fumigant

1. Before applying, keep the soil moist to a depth of at least 6 inches for 5 days. This germinates weed seeds and permits gas to reach deep roots. Cultivate crusted soils immediately before applying. NOTE: Do not apply to dry soils.

2. To apply with watering can: Place 1 pint of Vapam in a sprinkling can, fill with water, stir and sprinkle uniformly over 50 sq. ft. Immediately apply additional water to wet soil to 4 to 6 inches. **Hose proportioner**: apply 1 quart Vapam per 100 sq. ft. with proportioner having a dilution ratio of about 1:15. Drench area immediately with additional water. **Sprinkler system**: run sprinklers 5 to 10 minutes. Within next 10 minutes inject into the line 1 quart of Vapam for each 100 sq. ft. covered by system. Continue sprinkling until soil is wet to necessary depth.

3. After applying, immediately sprinkle with enough water to insure Vapam penetration to the desired depth and to seal in the gas. Fifteen to twenty gallons of water per 100 sq. ft. will penetrate to about 4 inches in light textured soils.

4. Before planting allow at least 14 days for well drained soil to dry and gas to dissipate after application. Allow 21 days on heavy soil. Allow 30 days if soil remains cold or wet. Cultivate 7 to 10 days after application to help gas escape. Do not cultivate below treatment depths.

How to sterilize pots, flats, and tools

Avoid contaminating treated soil with containers and tools. Dip them into a solution of 1 part Vapam to 10 parts water for several minutes. Then stack loosely outdoors until thoroughly dry before using.

Follow these precautions:

Protect desirable plants: Do not apply Vapam within 3 ft. of the drip line of plants, shrubs, or trees. On a slope be sure Vapam solution will not drain into areas of desirable plants. Vapam fumes can damage leaves of nearby plants if there is no air movement.

To clean equipment rinse thoroughly with water. Vapam may discolor copper or brass, but will not harm equipment if removed after each day's use.

Do not apply Vapam when soil temperature is below 50° F. Thirty days should be allowed between application and planting when soil temperatures are below 60° F. The soil must be well aerated if it remains wet.

quackgrass, nutgrass, wild onion, sheep sorrel, and crabgrass. The areas treated with VPM remained free of weeds for six months. Areas which were dug at the same time but not treated had to be hand weeded three times during the same period. The VPM treated areas should remain free of perennial weeds, although as seeds of annuals are carried into the beds some weeding will eventually be required.

Only healthy plants were moved into the treated beds, and these should remain healthy. VPM Soil Fumigant is known to control nematodes, damping-off fungi, mustard seed fungus, and many other disease organisms. In any event, the fall growth of iris in the treated beds was vigorous, normal and disease-free.

GROW BOUGAINVILLEA INDOORS

Florence Knock

Condensed from *Flower & Garden*, October, 1958

It may seem unusual for a gardener to become interested in growing bougainvillea in Minnesota, but just that has happened.

In one of the more comprehensive catalogs I noticed that bougainvillea variety 'Barbara Karst' was recommended for pot and window culture. The catalog stated that the bougainvillea could be pruned to conform to pot culture without eliminating its free blooming habit. The plant ordered arrived in fresh, ready-to-grow condition. It was about 12 inches tall and was potted in a 4-inch pot. It bloomed the following spring when only 18 inches tall, so I ordered dormant, 6-inch cuttings of other colors from Florida, and rooted them in water.

Their cultural requirements are simple. Almost any kind of soil suits them, but more prolonged, lush growth will result from richer soil and abundant moisture. I use a mixture of good, somewhat sandy loam, and add a fourth part each of peat and leaf mold or compost. A soluble fertilizer is also added to the pot once a month as a booster. They do well where they receive several hours of sunshine each day. My pots are on a table 12 inches from the window glass in an east window which seems completely satisfactory to bring blooms.

Roche

Bougainvillea is a colorful house plant

During the summer, the pots are placed outdoors where they are sheltered and shaded from the hottest sun, and get the rain, dew and cool nights. They are watered with the garden hose. The pots are not allowed to dry out. My established bougainvilleas are growing in 7- and 8-inch pots. Some varieties bloom when 12 to 18 inches tall, and, although blooms may appear at intervals throughout the year, my best blooming season has been during the spring, when it has continued for many weeks.

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PREDATORY FUNGI

Plants which trap insects are familiar in the folklore of biology. Less well-known, but more important in the balance of nature, are certain molds which ensnare and consume small animals in the soil

Joseph J. Maio

Condensed from *Scientific American*, July, 1958

UNLESS man succeeds in duplicating the process of photosynthesis, it appears that animals will always have to feed upon plants. But the plant world exacts its retribution. A number of plants have turned the tables on the animal kingdom, reversing the roles of predator and prey. These are the plant carnivores—plants that trap and consume living animals. Most famous are the pitcher plant, with its reservoir of digestive fluid in which to drown hapless insects; the sundew, with its fly-paper-like leaves; and Venus fly-trap, with its snapping jaws. But there are other carnivorous plants of larger significance in the balance of nature which are found in great profusion in any pinch of forest soil or garden compost. They are microscopic in size, but just as deadly to their animal prey as the sundew or Venus fly-trap.

These tiny predators are molds. They grow in richly branching networks of filaments visible to the naked eye as hairy or velvety mats. Like most bacteria, they lack chlorophyll and so must derive their food from other plants and from animals. Molds have long been familiar as promoters of the process of decay. It was not until 1888 that a German mycologist beheld molds in the act of trapping and killing live animals—in this case the larvae of a tiny worm, the wheat-cockle nematode.

The simplest molds have no special organs with which to ensnare their victims. Their filaments, however, secrete a sticky substance which holds fast any small creature that has the misfortune to come in contact with it. The mold then injects daughter filaments into the body cavity of the victim and digests its contents. Most of the animals caught in this way are sluggish amoebae encased in minute hard shells.

Some molds do their trapping in the spore stage. The parent mold produces staggering numbers of sticky spores. When a spore is swallowed by or sticks to a passing amoeba or nematode, it germinates in the body of its luckless host and sends forth from the shriveled corpse new filaments and new spores to intercept other victims.

The most remarkable of all killer molds are found among the so-called *Fungi Imperfecti*. These molds are particularly interesting because they are not killers by obligation but can live quite well on decaying organic matter when nematodes, their animal victims, are not available. If nematodes are present, these molds immediately develop highly specialized structures which re-adapt them to a carnivorous way of life.

One of these molds is *Arthrobotrys oligospora*. When nematodes are available, it develops networks of loops, fused together to form an elaborate nematode trap. A fluid, secreted by the mold, is so sticky that one-point contact with the network frequently is enough to doom the

For information on the extent of damage caused by nematodes to plants and crops in the U. S., see the 1955-1956 Winter issue of PLANTS & GARDENS.

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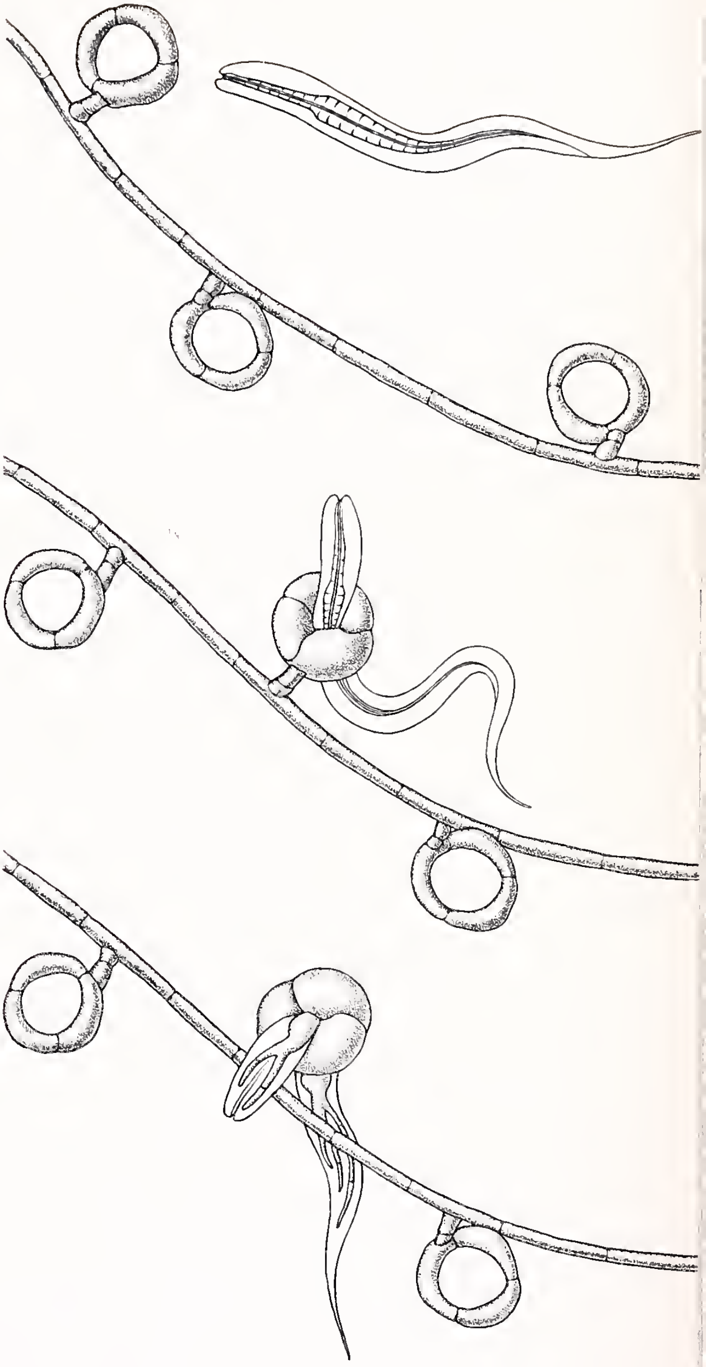
nematode. In its frenzied struggles to escape, the worm only becomes further entangled and finally, after a few hours of exertion, weakens and dies.

Even more artfully contrived are the "rabbit snares" employed by some molds. These are rings of filament which are attached by short branches to the main filaments, hundreds of them growing on one mold plant. The rings are always formed by three cells and have an inside diameter just about equal to the thickness of a nematode. When a nematode, in its blind wanderings through the soil, has the ill luck to stick its head into one of these rings, the three cells suddenly inflate like a pneumatic tire, gripping it in a stranglehold from which there is no escape.

The rings respond almost instantaneously to the presence of a nematode; in less than one-tenth of a second the three cells expand to two or three times their former volume, obliterating the opening of the ring. It is difficult to understand how the delicate filaments can hold the thrashing worm in so unyielding a grip.



Capture and consumption of a nematode worm by a fungus of the constricting-ring type. At top, the worm approaches a ring attached to a filament of the fungus. In middle, the three cells of one ring have expanded to trap the worm. At bottom, filaments have branched out of fungus to digest worm

We are not yet sure what cellular mechanisms activate these deadly nooses. We know that in the case of the constricting ring of one mold the activating stimulus is the sliding touch of the nematode as it enters the ring. A nematode that touches the outer surface of the ring will not trigger the mechanism. But if the worm passes inside the ring, its doom is certain. This mold, then, exhibits a sharply localized "paratonic" or touch response like that of the Venus fly-trap.

Some species of molds prey upon root eelworms that infest cereal crops, potatoes and pineapples. In one early experiment, conducted in Hawaii, a mulch of chopped pineapple tops was added to soil known to harbor the pineapple root-knot eelworm. This mulch produced an increase in the numbers of harmless, free-wandering nematodes which thrive in rich soil. The presence of these decay nematodes stimulated molds in the soil to develop nematode traps, which caught the eelworms as well as the harmless species. A recent experiment in England gives similar promise that molds may be effective against cereal root eelworm. Plants protected by stimulated molds showed slight damage compared to the eelworm-ravaged control plants.

The results of experiments on mold control of nematodes are already encouraging. They suggest that one day these peculiar little plants may perform an even more important role in agriculture than they played in nature, silently and unobtrusively, throughout the millennia before their discovery.

HYSTERIA AND HORTICULTURE

Eldred E. Green

Reprinted from *Garden Talks*, October, 1958

DURING recent years I have observed several rather pronounced periods of enthusiasm that were supposed to usher in the millenium for gardeners. First came the hydroponics craze. Everyone was going to grow potatoes in warehouses, tomatoes in the basement, and corn on roof tops. The farmer was doomed and the backyard was to be a large tank of water with a handful of chemicals added every now and then.

Then came the B-1 craze. This remarkable vitamin was going to revolutionize plant culture. You added it to the water, fed it in capsules, or used it as powder. It stimulated root activity; made plants grow better and faster. Only trouble was that most plants had enough of the stuff naturally anyhow.

Next was colchicine. Spray your seedlings and watch the results—freaks, monsters, giants in your own backyard.

Plant hormones were supposed to solve a lot of problems, but they didn't catch on much with the home gardener. He wasn't inclined to propagate many plants.

Chinese elm was heralded as the last word in trees. Fast growing, drought resistant, amenable to training, here was the perfect tree. A few drawbacks such as weak branches, shedding of small branches and twigs, soft wood, etc. took the edge off this craze. Eventually the Chinese elm came to be just another tree for screens, hedges and drought conditions.

Do you remember the rock garden craze? You just had to have a pile of boulders with some plants growing between them. A pool the size of a wash basin was a must even if it was too small for waterlilies or fish, and just right for mosquitoes. Rock was the thing — but as for the plants? Oh, just plant any-

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thing and call it a rock garden. Extra work in weeding, extra work in planting and extra work in piling up rocks were the major results of that era. But it surely cleaned up a lot of rocks from the vacant fields and roadsides!

Along about the end of the war came the DDT craze. Here was the answer to all the garden pests. "Spray the stuff and watch 'em prance, round and round in crazy dance, swaying and swirling, on and on, half an hour and all are gone." But aphids and mites and rusts and blights all were resistant to blast our delights. Back to rotenone, pyrethrins and sulphur.

Maleic hydrazide—here was the stuff to stunt your lawn. But time did pass, and so did the grass.

African violets, lo and behold!
Grow 'em in a window, but not too cold.
Pet them and pamper them, hope for bloom,
You sure need something to fill up a room.

And recently came Zoysia grass. A lawn without work. Cut the grass only a couple of times a season.

Zoysia, Zoysia, where can you be,
Here 'tis April and no green I see.
Zoysia, Zoysia, where have you gone,
It's only October and you've turned brown.

Well, it's still a short lawn even if it only grows for four or five months, and looks like crab grass.

There's an old saying that "you can't beat the Dutch." Well we did it! While the Dutch elm disease was raising havoc in the east, we had it worse in the vicinity of Chicago. Every elm that died of phloem necrosis, old age, lightning, drought, or anything else had the Dutch elm disease, or so people claimed, and the Dutch got blamed for it.

So hysterias come and go. One craze succeeds another in horticulture, medicine and politics. Every cure-all raises other problems. But there is still progress being made. Underneath the wild claims and statements there is an essence of truth and from these comes progress. Today we have water-soluble fertilizers, a renewed interest in humus, some genuine rock gardens, better insecticides, and more attention to newer grasses and better trees. So when the next hysteria comes along, keep your feet on the ground and your hand on your pocketbook.

ASPARAGUS EXTRACT KILLS NEMATODES

Condensed from the *Farm Journal*, August, 1958

AT the University of Maryland, a team of scientists has isolated a chemical from asparagus plants which, when sprayed on tomato leaves, kills nematodes attacking the tomato plant's roots.

The Maryland team, including Dr. William R. Jenkins and Richard A. Rohde, hit upon the trail of their new chemical when they made a state-wide nematode-damage survey. They observed that asparagus was affected less by the pests than any other plants.

In tracking down the "why" of this resistance, they found that plain asparagus juice killed all types of nematodes found in Maryland.

When they later isolated the toxic chemical from the asparagus juice, it killed root knot, sting, stubby root and meadow nematodes—even at .01% solution strength.

"It gave considerable protection to tomato plants when we used it as a drench around the roots," says Jenkins. "But when we sprayed it on the leaves and it was carried down into roots, we found that it did even better."

Jenkins and Rohde say that several chemical companies already have shown an interest, and that they think the chemical may soon be developed commercially.

Meanwhile they are looking into other nematode-resistant plants in hopes of isolating additional pesticides.

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TREES AND SHRUBS WITH WIDE DISTRIBUTION

Emily Brown*

THE ability of certain kinds of plants to flourish under widely different conditions is of interest to garden enthusiasts for many reasons. A tree or shrub that is versatile enough to be tolerant of many different climates, soils, quantities of moisture, etc., is a challenge to our understanding. But more important here, such species can be grown in many parts of the civilized world, and thus become recognizable by travelers everywhere. They then become of "universal" value and interest.

The dawn redwood (*Metasequoia glyptostroboides*) made such a mark in horticultural history that it was distributed to people in many regions, for testing. It has grown successfully from Southern California northward on the West Coast of the U.S.A., and from Louisiana northward and eastward to Massachusetts, southern Maine and Vermont. Another versatile conifer is Japanese black pine (*Pinus thunbergi*). It tolerates heat and wind and will stand all climates—whether hot or cold. It makes no demands as to feeding or pruning, and although it does best in a light, well drained soil, it grows successfully under almost any soil conditions.

One might also single out for special mention some of the flowering trees, such as the flowering crabapples, cherries, peaches, magnolias and others. Or such flowering shrubs as rhododendrons and azaleas.

To bring before gardeners and horticulturists my search for plants that are universally adaptable, I submit the following tentative list. Where only genera are given here, I hope all who are interested will elaborate on species when reporting to me on the plants of their region that they feel are candidates for the list of "highly adaptables."

Scientific name	*Common name*
Abelia grandiflora	Glossy Abelia
Acer negundo	Box-Elder
A. ginnala	Amur Maple
Aesculus carnea	Red Horsechestnut
Ailanthus altissima	Tree-of-Heaven
Albizzia julibrissin rosea	Silk-Tree, hardy form
Aucuba japonica	Aucuba
Broussonettia papyrifera	Paper Mulberry
Buddleia (many kinds)	Butterfly-Bush
Camellia japonica (and others)	Camellia
Cedrus atlantica (also *deodara* and *libani*)	True Cedars
Cercidiphyllum japonicum	Katsura-Tree
Cercis canadensis (and others)	Judas-Tree, Redbud
Cryptomeria japonica	Cryptomeria
Chaenomeles japonica (and others)	Flowering Quince
Chionanthus virginica	American Fringe-Tree
C. retusa	Asiatic Fringe-Tree

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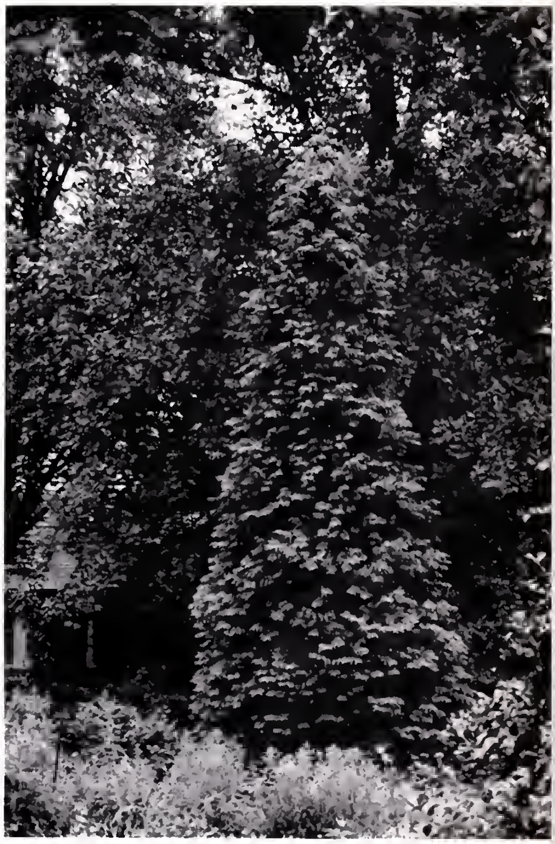
*Mrs. Brown will be glad to have reports from growers of trees and shrubs in climates where conditions are more extreme than in California (whether drier, colder or hotter). In short, if you have had experience with species that you consider almost universally adaptable, she wants to hear from you. Address: Mrs. Hillyer Brown, 3045 Ralston Avenue, Hillsborough, Calif.—ED.

Cornus florida	Dogwood
Cotoneaster horizontalis (and many others)	Rockspray Cotoneaster
Deutzia gracilis (and other species)	Deutzia
Elaeagnus angustifolia (and others)	Russian Olive, Oleaster
Fagus sylvatica	American Beech
Ginkgo biloba	Gingko, Maidenhair-Tree
Hibiscus syriacus	Rose-of-Sharon
Hydrangea (numerous species)	Hydrangea
Idesia polycarpa (root suckers badly in southern Calif.)	
Ilex aquifolium, cornuta, pernyi, and others	Holly
Juglans nigra	Black Walnut
Juniperus	Junipers, Red-Cedar
Koelreuteria paniculata	Goldenrain-Tree
Leucothoe catesbaei (requires acid soil, but otherwise widely adaptable)	Drooping Leucothoe
Ligustrum (many kinds)	Privet
Liquidambar styraciflua (and others)	Sweet Gum
Liriodendron tulipifera	Tulip-Tree
Lonicera (many kinds, deciduous and evergreen)	Honeysuckle
Maclura pomifera	Osage-Orange
Magnolia (many kinds)	Magnolia
Mahonia aquifolium	Oregon-Grape
Mahonia beali	Leatherleaf Mahonia
Maytenus boaria (8° above zero is minimum)	Mayten
Morus nigra and others	Mulberry
Metasequoia glytostroboides	Dawn Redwood
Paulownia tomentosa	Empress Tree
Platanus occidentalis (and others)	Plane-Tree, Sycamore
Pinus thunbergi (and others)	Japanese Black Pine
Poncirus trifoliata	Trifoliate-Orange
Prunus (numerous species)	Cherry, Peach, Plum, etc.
Pyracantha (several kinds)	Firethorn



McFarland

Metasequoia is one of the most adaptable plant introductions of the century

Rhododendron (several kinds)	Rhododendron, Azalea
Rhus typhina (and others)	Staghorn Sumac, and others
Ribes (numerous kinds)	Currants (ornamental)
Robinia pseudoacacia	Black Locust, Common Locust
Rosa (many species and hybrids)	Roses
Salix babylonica (and others)	Weeping Willow
S. matsudana var. *tortuosa*	Contorted Matsudana Willow
Sapindus drummondi (in Los Angeles area)	Western Soapberry
Sophora japonica	Scholar-Tree, Pagoda-Tree
Spartium junceum	Spanish Broom
Spiraea (the usual better garden types)	Spirea
Syringa vulgaris	Lilac
Taxodium distichum	Bald Cypress
Thuja occidentalis and *orientalis*	Arbor-Vitae
Ulmus parvifolia	Chinese Elm
U. carpinifolia var. 'Christine Buisman'	
Viburnum (many species)	Viburnum
Zelkova serrata	Gray-bark Elm, Japanese Zelkova

PLANT LABELS THAT LAST

Recent experiences in labeling at the University of Michigan Botanical Gardens

P. B. Kaufman and A. G. Norman

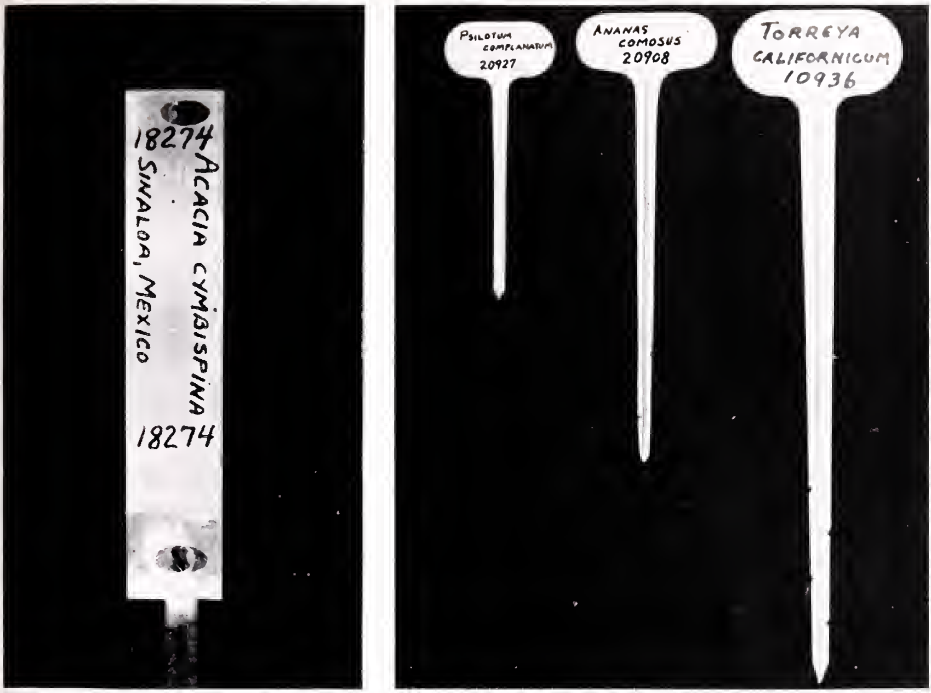
LABELING plants grown in greenhouses or outdoors at botanical gardens, arboreta and parks has been a problem for decades. The ideal label should be durable, readily and permanently legible and of modest cost. All types of labels that have been developed seem to have shortcomings in one or more of these respects.

After many years of experience with zinc labels, which have been far from satisfactory in legibility, the University of Michigan Botanical Gardens has partially substituted plastic labels and has developed a type of informative label which appears to combine easy legibility with reasonable permanence.

Zinc labels. Until recently, zinc labels have been used to identify all the accessioned plants here. These labels usually bear the accession number, scientific name and origin of the plant. This information is inscribed on the label with a 3 per cent aqueous solution of platinum chloride. Small plants grown in pots have the label placed directly in the soil. For plants grown in larger pots or tubs and plants outdoors, the label is attached to iron stakes with brass machine screws and nuts through holes placed at either end of the label and through the stake.

Zinc labels have proved to be relatively permanent, especially in outdoor situations. When attached to iron stakes they are not easily removed or displaced. Loss through vandalism is negligible.

However, they have several shortcomings. Placed directly in the soil, they corrode readily and in time lose their legibility, sometimes to the point that one can detect the writing only by wetting the surface of the label. Silicone treat-



Zinc labels (*left*) are useful principally in botanic gardens. Inexpensive plastic labels (*right*) are available in several sizes and shapes; they remain legible, indoors or out

ment has not delayed onset of corrosion significantly nor improved legibility. Zinc labels are not attractive and the amount of information that can be included on a label is limited.

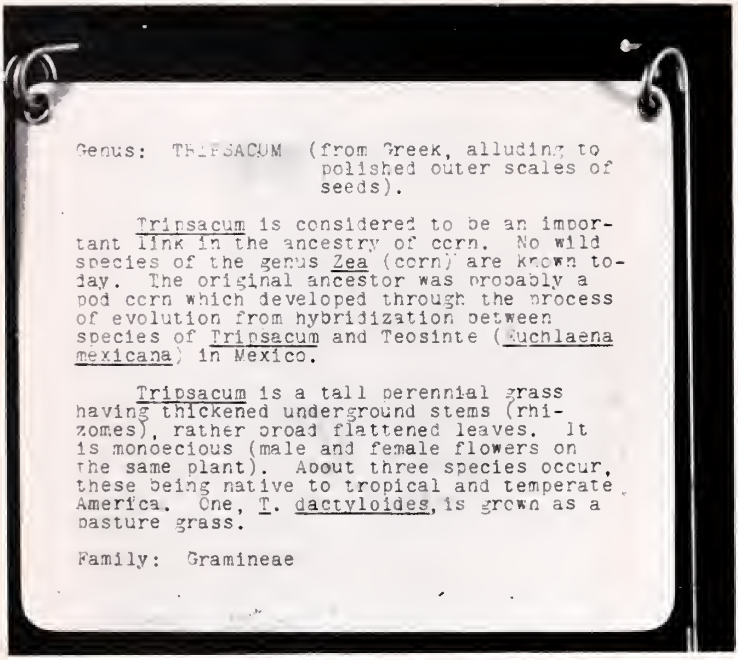
Plastic labels. White plastic tee labels are being used to replace zinc labels indoors. They are lettered with India ink with an ordinary stylus or with a "Leroy" lettering set. Since India ink tends to chip or wash off, the labels are dipped in clear shellac after lettering. This treatment has been effective for 18 to 24 months. Recently, one of our colleagues, Professor W. R. Taylor, informed us that he has had exceptional success lettering plastic tee labels for outdoor use with asphaltum acid resist as ink. We are trying this method now and think it will prove very satisfactory.

We find that the plastic tee labels are much more legible and more attractive in appearance than zinc labels when used on our plant collections indoors. They are not easily displaced from the pots; different sizes can be selected which are suited to the dimensions of the plant.

Laminated labels. In 1956 we began an informative labeling system with laminated plastic labels, aimed at presenting to visitors information of general interest regarding some of our plants.

This information is typed on pastel colored bond paper with large pica type which can be easily read. We use yellow paper for monocotyledons, green for dicotyledons and blue for gymnosperms and the lower vascular plants. Recently we have started using the "Leroy" lettering set for preparation of labels where still larger characters are desired and a minimum amount of information is required on the label.

After the labels have been typed, the paper is cut to the desired size and sent to a professional laminator. His machine is capable of laminating pieces up to 6 by 8 inches. White plastic is used for the back of the label, clear plastic for the front. A one-quarter-inch white margin



Genus: TRIPSACUM (from Greek, alluding to polished outer scales of seeds).

Tripsacum is considered to be an important link in the ancestry of corn. No wild species of the genus Zea (corn) are known today. The original ancestor was probably a pod corn which developed through the process of evolution from hybridization between species of Tripsacum and Teosinte (Euchlaena mexicana) in Mexico.

Tripsacum is a tall perennial grass having thickened underground stems (rhizomes), rather broad flattened leaves. It is monoecious (male and female flowers on the same plant). About three species occur, these being native to tropical and temperate America. One, T. dactyloides, is grown as a pasture grass.

Family: Gramineae

Laminated Labels

This type of label has typed paper laminated between plastic sheets for permanency, and eyeletted so that label can be attached to wire stakes or other supports

is obtained by cutting the white plastic back one-half inch larger than the paper label being laminated. The plastic seal obtained has been completely satisfactory under our conditions.

Laminated labels can be cemented to white plastic tee stakes. Cements with xylene type solvents have not been satisfactory. The seal is not complete and some of the plastic may be dissolved by the solvent.

Labels which are to be attached to iron or wire stakes are eyeletted by the laminator. An application of "Duco Cement" on both sides around the eyelet prevents the entry of water between the plastic sheets. For outdoor use labels can be attached to iron stakes with brass machine screws through eyelets placed at the top and bottom of the label. Others are eyeletted at the upper corners; these can be attached to wire stakes having coils at one end by inserting the coil into the eyelet.

Direct attachment of labels to tree trunks is possible by driving short galvanized or aluminum nails through the eyelets into the bark. Others, eyeletted laterally, are attached to the trunk by means of a stainless steel spring which is placed around the trunk and attached to one or both eyelets of the label. In still others, short spring pieces (2 to 3 inches) are attached to eyelets on either side of the label; the springs are fastened to the trunk by means of nails driven through the ends of the spring pieces.

These laminated labels retain their high legibility and attractive appearance for more than two years. There may be fading of the pastel colored paper, but apart from this, they will probably have a relatively long life.

The cost of laminating our labels depends upon the size and number of labels which can be obtained from 6- by 8-inch sheets of plastic. A single label 6 by 8 inches costs sixty cents. Two labels of smaller dimensions, obtained from the same stock material, cost thirty-five cents each, while three labels cost twenty-eight cents each. Eyelets are provided at three cents apiece.

WHAT THE LANDSCAPE ARCHITECT CAN DO FOR YOU *

Reprinted from the *Arboretum Bulletin*, Summer, 1958

Q. *What is landscape architecture?*

A. Landscape architecture is the profession of designing land for the use of man with an effort towards beauty. Several universities, both here and abroad, have recognized courses in landscape architecture. A landscape architect differs from an architect in that he deals primarily with grounds and their treatment rather than structures. He differs from a landscape contractor and a landscape gardener in that he designs and supervises only, whereas a contractor, as his name implies, contracts the actual work and a gardener furnishes the plants and labor.

Q. *What is the scope of a landscape architect?*

A. A trained landscape architect has studied both architecture and engineering as well as landscape history and design, horticulture, soils, irrigation and other details of his profession. He is more than the popular conception of a designer of foundation plantings and flower gardens. He often specializes in certain branches of his profession, such as parks, industrial sites, large scale housing projects, public buildings or private homes. Because of his comprehensive training he is capable of success in any of these branches even though his personal preference has kept him in one particular field.

Q. *What is the value of this profession to you?*

A. Some nurseries and contractors offer "free plans" if one deals exclusively with them. This is tempting until one realizes that nothing is really free, and that the plans are paid for by the profit from selling the plants or doing the work. Also no one nursery carries *all* the most desirable plants. The landscape architect does not profit from the plants or other materials used and is free to order the best plants for the job from many nurseries if necessary. He is the client's agent, paid only by the client for his advice so that the landscape development best fits the client's needs and pocketbook and the job is completed exactly as planned. His only advertising is a satisfied client.

Q. *What does it cost to employ a landscape architect?*

A. That somewhat depends on whether the job is designing San Simeon for the late Mr. Hearst or sketching a small city lot for Mrs. Newlywed. The bigger contracted job is usually based on a percentage of cost. On lesser jobs a fixed fee or an hourly rate is charged for time spent on consultations, plans, supervision, etc. The method of charging can depend on the wishes of the client and is based in any event on time spent on the job. As anyone who has attempted unfamiliar work knows, experienced advice can save money and is definitely worth the price.

Q. *What is involved in planning a new lot?*

A. If a lot has not yet been selected, a landscape architect can evaluate the costs

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*A condensation of a panel discussion arranged by the Arboretum Foundation and held at the University of Washington. Panel members: J. David Jensen, Linley Janzen, Raymond A. Brauner, Charles de Turk, Noble Hoggson. Moderator: Edward B. Thomas, Educational Director, Seattle Art Museum.

Published by the Arboretum Foundation, University of Washington Arboretum,
Seattle 5, Wash.

Frese

The kitchen, dining room and living room windows were planned to face this colorful patio

of developing one lot (hillside requiring retaining walls, but having a good view) as against another (bottom land requiring drainage but having a delightful little brook).

If the lot is already acquired, the architect and landscape architect should work as a team from the start. It will be found far cheaper to lower a grade with an eraser on the plan than with a bulldozer after the house is built. Topsoil is expensive, especially when buried under foundations and replacement has to be bought by the truckload.

Should the owner have purchased a ready built home, the landscape architect can organize the completion of lawns, plantings, walks, etc., before occupancy, so as to avoid those first messy weeks. For the smaller property, just the sketch plan, supplemented by occasional consultations or supervision, will be sufficient, or, in the case of an intelligent owner doing his own work, consultation alone will achieve satisfactory results at a minimum cost.

The things to be considered in landscaping, whether on plans or in the head, are on the lot, its exposure, slope, view, existing trees, soil, etc.; the house, its size, architecture, orientation, etc.; the client, his desires, interests, hobbies, etc.; and, last but not least, the money available. This last is very important as complete confidence between landscape architect and client results in pleasant relations and a good job. False pride about financial matters has no place here and can cause unpleasant misunderstandings. So take the above ingredients of lot, house, owner and purse, mix intelligently, and you are bound to evolve a charming home, enjoyable and easy to maintain, which will work for you rather than your slaving for it.

Q. *What can a landscape architect do for an old place?*

A. In many cases the older property has never been professionally designed—just planted at the whims of perhaps several former owners. The various areas need professional coordinating and certainly simplifying, as they were probably "laid out" and planted in the days of adequate gardening help. Flower beds in lawns, crooked shrub borders, useless pools and overgrown rockeries may be simplified or removed entirely for ease of maintenance. The less desirable overgrown trees and shrubs should be moved or cut down to benefit the others.

But principally the design needs changing to suit today's living, lack of gardeners and the different uses and interests of a new owner. Even the older place, landscaped originally by a professional, could well be rejuvenated by a trained landscape architect who is able to evaluate the original design, take advantage of existing conditions and yet make a more usable property. Perhaps the shrubs have overgrown their original part in the design, or there are unsightly gaps in the plantings and they could benefit by a complete rearrangement. Possibly a favorite tree, now obscuring a window, should be moved to a more desirable location. A former garden or perennial border close to the house and requiring much work could be converted to a labor-free terrace or patio. A new automatic sprinkler system can eliminate unsightly faucets in the lawn and the onerous chore of dragging hoses. With plastic pipe or copper tubing it could be readily installed without disturbing the existing planting to give more efficient watering with less water.

Whether it is the complete remodeling of a big property or the simple relocation of a few plants, the landscape architect can help the owner modernize his property in good taste at reasonable cost.

Landscape plantings were restrained here in favor of extending the outdoor living space

Gottscho-Schleisner

THOUGHTS PROMPTED BY THE BRUSSELS FAIR

Mrs. Leslie Cheek, Jr.

Reprinted from the *Bulletin of The Garden Club of America*, November, 1958

THE Brussels Fair, so much discussed in press and film, had a distinction that is seldom mentioned. Everywhere one went during opening week it was obvious that imagination and effort had been expended lavishly on landscaping. The site of the Fair was a vast royal park, with magnificent old trees and large grass areas. One hundred and thirty-five buildings were constructed for the Fair and not a single important tree was felled. Everywhere caches of beauty were a surprise and delight. Rounding the end of the building devoted to Champagnes, on the way to Forestry, a deep ravine stretched at one's feet literally paved with the gold of daffodils, specimen varieties, thousands and thousands of them under the highborne branches of huge beech trees.

An example of the precision and care with which most landscape work is done in Europe interested us especially. A round hill was crowned with a particularly handsome grove of tall beeches. An imaginative eye had thought of it as a shady vantage point for weary sightseers, and drinking fountains had been built in an attractive circle of stone.

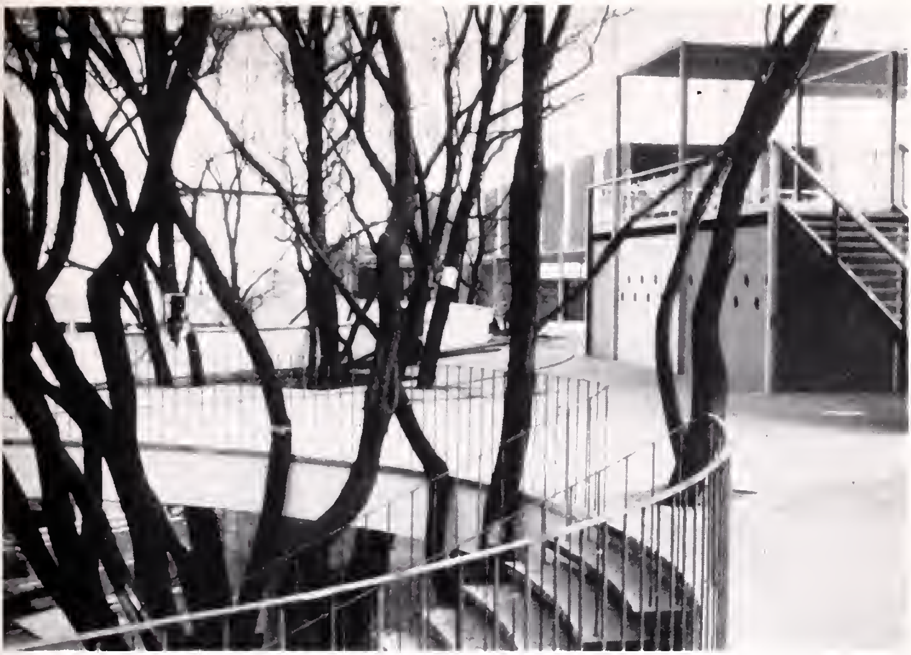
Most of the International Buildings gave landscaping an important place in plan and a large share in funds. Our own pavilion devoted more than a third of its site to an inviting plaza where fifty fountains played in a huge pool, surrounded by an entire orchard brought from Normandy, of wine-glass shaped apple trees. Under each apple tree was a round bed of flowers that were changed with the season. The balcony girdling our circular glass and anodized aluminum building was hung with luxuriant ivy and punctuated with clipped bay trees.

The French Pavilion had, in its garden, beds of yellow and blue surrounded by most luxuriant lawns. Japan's green garden made skilled use of the trees and natural variety of its site. The Netherlands, centering their exhibition around their ancient struggle with the sea, did not neglect the bulbs for which they are renowned. Raised brick-edged beds about 8 feet square, with solid plantings of white or blue hyacinths, made a charming checkerboard pattern with squares of sedum set at ground level. The glass entrance of the Lowlands Building lured one with the flower arrangements just inside. Each container held specimens of only one variety of bulb, in profusion, and both arrangements and varieties were changed daily.

Britain, Switzerland, Germany and Yugoslavia all had small lakes in their plans. Britain with picket fences, wallflowers and geranium-filled window boxes, Switzerland with massed rhododendron, Germany with neat flower beds under tall trees, Yugoslavia with blooms that changed with the calendar, around a terrace restaurant overlooking the water. The Republic of San Merino built its small and elegant pavilion around a single spectacular, gnarled, and widespreading oak; the effect was stunning.

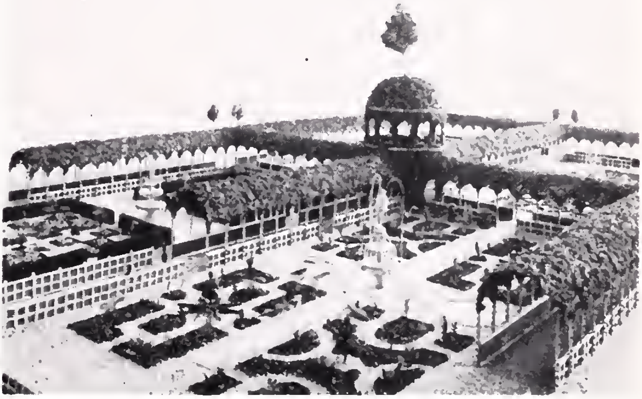
An international exposition is a sometime thing and hardly the pattern for any community. But since we Americans are descendants of so many fatherlands, it seems that we are particularly free to respond and to learn from all peoples. More of us are travelling abroad than

Garden Club of America, 15 E. 58th St., New York 22, N. Y.



he United States avilion

bove. None of the trees in the
yal park, site of the Fair,
uld be disturbed, so part of
e U. S. pavilion was built
round these willows. Charles
iddeleer, landscape architect



arden of the our Seasons

ight. The floral patterns of
is garden in the Belgian sec-
on are clearly defined in this
act model of a 16th Century
Renaissance park

any nation has ever travelled. Have we not an unparalleled opportunity to perceive, and to mark, all that is most beautiful in the long tradition of European, Oriental, or Near Eastern landscape design and to transplant that feeling for growing things more generously into our varied climates?

We are doing this already; all over America one finds examples. But we need much, much more. Perhaps we need more of the improbable faith of the Italians; that growing things betoken good people, because growing things, beautifully arranged, are an absolute necessity of the soul.

WHAT THE BOTANIC GARDEN MEANS TO ME*

Lucille Plotz

TUCKED away in a corner of the Brooklyn Botanic Garden is a special place which is well known to only a few. This is the Woodland Garden. Planted on only two acres of ground here are simulated all the conditions necessary for the happy survival of wild plants native to the area within a hundred miles of New York City. Within this limited area, the rocky forests of New York State are only a stone's throw from the New Jersey sand plains, and neither interferes with the bog planting a few feet away. Careful re-cultivation of this ground has provided just the right exposure and drainage for the timid, retiring plants that were native to the metropolitan area when this was the homeland of the American Indian.

Back in the days of the Botanic Garden's beginning, the landscape architect who helped convert an ash heap into one of the world's most treasured botanical institutions, devised the clever scheme of the border mound. This is a continuous hill, planted with shrubs and trees, running the length of the Garden along its bordering avenues. The mound shuts out the sight and sounds of the cars on the busy thoroughfare only a few yards away, so when you are in the Woodland Garden not much imagination is required to sense the peace and dignity of a wooded countryside.

Walking along these isolated paths can mean all manner of things to all people: to the child who has never seen the country it is a revelation in the beauty and delicacy of nature; to the adult long since come-from a small town childhood, it can reinvoke poignant memories; to the naturalist, it can illustrate knowledge gained from books; to the horticulturist, steeped in showy formal plant display, it expresses the humility of nature; to the individual who likes a private place for a thoughtful stroll, it offers seclusion; to the family it provides a place for old and young to discover together the precious treasures of nature.

In order that we visitors may avail ourselves of this beauty, it has been arranged for Mr. Harry Betros, who is in charge, to talk to groups of people who want to learn a little about the native flora growing in the Woodland Garden. These talks begin when springtime causes nature to make such an exciting development, and they are given at different times on different days, to accommodate as many people as possible. And any fair day you care to look for him, Harry will be found at work, maintaining the conditions these timid plants need to thrive.

I think that acquaintance with the Woodland Garden will lead to greater appreciation of other opportunities in the Botanic Garden, appreciation of the thought and work of centuries which have gone into the development of gardening to the state it is in today. And appreciation is what this Garden gets a great deal of these days. I've seen the crowds of people who gather on a sunny holiday, or when the displays of cherry blossoms or chrysanthemums are at their peak. These are people bent not only on the good time they could have outdoors in any park-like area, but also on absorbing some of the especially nurtured beauty to be found here. Not a great many, perhaps not enough of these people, know that this Botanic Garden offers more than the chance to be a spectator. The opportunities to become intimately involved in the Garden by attending lectures and courses,

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*Part of Mrs. Plotz' address at the Forsythia Day Ceremonies, April 9, 1958

Gottscho-Schleisner

In the sand-barren section of the Woodland Garden are such native plants as sweet-fern, bearberry, New-Jersey-tea and beach plum

Right. Swamp candles (*Lysimachia terrestris*) reach their height of bloom in July

Below. Red milkweed (*Asclepias rubra*) is found in the bog section of the garden

and working in the greenhouse, and meeting the rare combination of people on the staff, are open to all who seek them.

The years of pleasure and enjoyment I have derived from my contacts with the Botanic Garden are not unique. I know of many others, women and men, who have received the same gratifications as I. The Garden gives of itself; and the populace of this Borough, the entire New York area, and visitors from afar, are fortunate indeed! Like so many other families, my husband and our three sons share with me the joy of gardening. In fact, my husband is apt to quote to me this saying: "If you want happiness for a day, take a wife; if you want happiness for a week, kill your pig; if you want happiness for a lifetime, plant a garden."

TAKEO SHIOTA'S JAPANESE GARDENS

Clay Lancaster

A GENERATION ago, the Japanese garden was as well represented along the eastern coast of the United States as it is in California today. There were tea gardens at summer resorts such as Atlantic City, New Jersey, and Ocean View, Virginia, and numerous private gardens in Japanese style throughout New England and the Middle States.

The person responsible for the greatest number in the vicinity of New York City was a Japanese gardener by the name of Takeo Shiota, who arrived here during the first decade of the century. Only about half of the gardens he is known to have conceived are still in existence, and most of these have suffered severely from neglect.

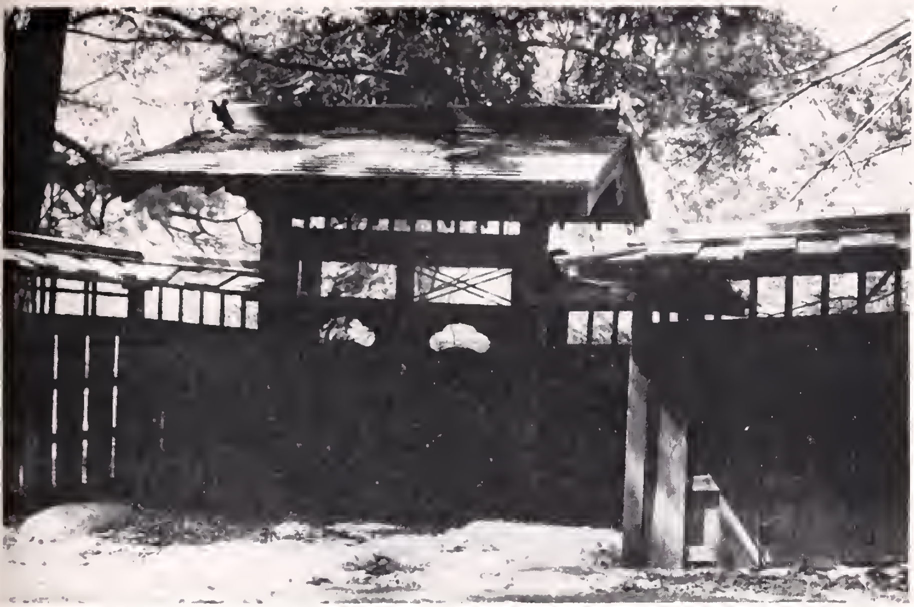
Takeo Shiota was a farmer's son, born in a small village about 40 miles east of Tokyo in 1881. He was a mischievous boy, fond of roaming around the countryside, which, in that part of Japan, is wild and picturesque, and spotted with old castles, shrines and temples. From this boyhood occupation Takeo acquired a genuine love for beautiful scenery. In time, his character changed and he became calm and thoughtful, and decided to study landscape gardening.

After graduating from high school he set out on foot to see the famous sights of his native land, and in this manner traveled throughout half of the Island Empire. Then he placed himself under a teacher to learn what he could of the formal and practical elements of the art of gardening. From the teacher he gained technique, but he felt that the true spirit and principles of creating fine gardens could be learned only from nature. The small garden should reflect the essence of a vast landscape panorama. Like a Far Eastern landscape painting, the garden must express the infinity of the universe; it must be, in fact, a microcosm representing the total cosmos. Takeo Shiota spent five years in further independent study, again journeying to inspect scenic places in Japan. Finally, he left for America.

Upon arriving in the United States in 1907, Takeo Shiota's ambition was to make the most beautiful garden in the world. It is not to be wondered at, therefore, that he came directly across the continent to this country's largest city, New York, seeking the opportunities it had to offer.

A tangential project that came his way was designing a miniature artificial Japanese landscape for the Newark Public Library. Mr. Shiota drew the plans, which were sent to the workshop of Yamanaka and Company in Japan, where

Pool and pavilion in the Japanese garden on P. D. Saklatvala estate in Plainfield, N.J.



Clay Lancaster

Gateway to the Japanese garden on the Misses Scofield estate in Tuxedo Park, N. Y.

the elements were executed in wood and plaster and other materials. Yamanaka was a concern importing art objects from the Far East; its New York shop opened in 1893. Received in America, the pieces of the landscape were assembled by the designer. The model was scaled one-seventy-fifth life size, and was enclosed in a glass case, measuring 4 by 6 feet, that stood for some time in the entrance hall to the library.

Upon the completion of the miniature landscape in 1915, Takeo Shiota had seven or eight full-size gardens to his credit. One of these was at Georgian Court, the George Gould estate at Lakewood, New Jersey. The Japanese garden functioned as a retreat from the grandiosity of the palatial mansion and formal gardens, with their balustrades and statuary; it served the same purpose as Marie Antoinette's Hameau and grotto at Versailles. The Japanese garden on the Gould estate is quite small. It features a little Japanese house with a thatched roof, by a clearing, across from which meanders a clear brook. A gateway near the house and several stone lanterns lend further interest to the ensemble. Georgian Court is now a Catholic School for young ladies.

Another Shiota landscape in New Jersey is that constructed for a Parsee importer, Mr. P. D. Saklatvala, at Plainfield. This garden has a broad stream traversing it, crossed by a low-arched bridge, in addition to a pool formed in the shape of the state of New Jersey. A square pavilion of two floors stands near the pool. It has an external staircase. There are also an open shelter, a small shrine containing a lifesize hammered copper bust of the owner's mother, who was a member of the industrialist Tata family of India, and lanterns, a stone bodhisattva, and a gateway at the edge of the lawn. In this garden is said to have been filmed part of the movie, "Madame Butterfly," by Adolph Zukor, starring Mary Pickford, released November 8, 1915.

Takeo Shiota constructed a Japanese garden on the Misses Scofield estate in Tuxedo Park, New York, the large stone house, by Walker and Gillette, architects of New York City, itself containing one

A plant of *Ilex crenata convexa* is pruned into precise form by Frank Okamura, gardener and caretaker of Brooklyn's Japanese garden. The contour of this holly complements that of the drum bridge

Buhle

room in pure Japanese style (recently removed). A board fence, open just below the roof, surrounds the garden, the entrance to which is through a beautifully proportioned and exquisitely detailed gateway opening from a recessed forecourt. The house has been tenantless for years, the grounds allowed to become overgrown. Consequently, one cannot tell much about what the Japanese garden was like forty years ago. A noteworthy little building in it is an authentic *chaseki,* or ceremonial tea-house, containing a four-and-a-half mat tea-room, with deep alcove for the display of flower arrangement and hanging scroll painting, the sunken pit for the tea brazier in the square center mat, a low *nijiriguchi* (creeping-in entrance) from outside, and having a full-size sliding door leading into the L-shaped preparing and storing room with its higher ceiling.

The crowning achievement of Takeo Shiota's career in New York was his oriental landscape created in the Brooklyn Botanic Garden, which several knowledgeable Japanese have pronounced the most authentic and perfect of its kind in America. The garden centers upon a small lake, the outlines of which describe the strokes of the Chinese character *hsin,* meaning "heart" or "mind." The lake is fed by a waterfall that tumbles down a rocky hillside framed by masses of wisteria in May. An arched bridge with railing and carved posts capped with copper hoods spans the mouth of the basin below the waterfall that flows into the lake. Nearby is a small island, reached by a plain drum bridge. A roofed waiting bench for five persons is on the mainland adjoining the path that skirts the shoreline of the lake. Opposite is a tea house and open pavilion built over the water, the trellis over the latter also draped with wisteria in season.

In the largest section of the lake stands a *torii,* or gateway, offering its best view to the tea house and adjacent shore. The origin of the word *torii* is a matter of dispute: the Shinto protagonists trace it to the indigenous word for "bird," claiming the form to have been devised as a perch for sacrificial birds; whereas those favoring a Buddhist origin link the name with the ancient Sanskrit word for gateway, *torana,* literally meaning that which one crosses, or passes through

Three Chinese characters on a plaque near the top of the *torii* read, *ta ming shen* (or *dai myo jin* in Japanese), meaning, "great illuminating deity," indicating the dedication of the garden to the Shinto God of the Harvest, protector of plants. A tall pedestal-type stone lantern stands near the waterfall, and a low, broad-roofed "snow-viewing" lantern, recently added, on the island.

The planting in this garden is kept scrupulously faithful to Japanese taste. The garden was the gift of the late Mr. Alfred T. White, opened to the public on June 6, 1915. Here, at least, is one example of Mr. Shiota's handiwork that has been tended with expert care, so that it has mellowed and become more beautiful with the passage of time.

For several years, following the First World War, Takeo Shiota formed a partnership (Rockrise & Shiota) operating at 366 Fifth Avenue, in New York City. In the metropolis' last city directory, a decade later (1933-34), Mr. Shiota was listed as a florist, residing on Saint Nicholas Avenue. As a matter of record he was Head Florist of the Astor Hotel, providing all the floral decorations used in the hotel, and also was responsible for the North Garden on the roof, which now has been abolished. Takeo Shiota was with the hotel on Times Square until his death in 1946.

He loved the out-of-doors, and for several months each year would go to the woods of North Carolina and Virginia to hunt and fish. As he himself expressed it: "To go far from the noise of civilization, to live the simple country life and breathe deeply of pure air—that is the cleanser of life." One wonders if he did not miss the picturesque castles and temples of his native Japan on these southern rambles, or was he content with the trees and hills and the sky, the ageless properties of nature that can be found all over the world?

The rhythmic form of the hillsides and trimmed plants, stepping stones and quiet water in the Brooklyn Garden symbolize ideas about life

Gottscho-Schleisner

Some of Mr. Yoshimura's 7,000 bonsai trees on display in his Kofu-en Nursery in Tokyo

WITHIN THE BROOKLYN BOTANIC GARDEN

The Garden is fortunate in having persuaded Mr. Yuji Yoshimura of Tokyo to come to this country, through its C. Stuart Gager Fellowship, to offer advance training in bonsai culture. His courses have been a most stimulating experience for several hundred members and friends of the Garden. Mr. Yoshimura was the first person to offer a bonsai course in English in Japan to foreign visitors. His father before him studied under the Bonsai Master Yonekichi Kibe. With one of his early pupils, Mrs. Giovanna M. Halford, formerly of the British Embassy in Tokyo, he wrote "The Japanese Art of Miniature Trees and Landscapes", recognized as one of the best books ever published on the subject.

Frese

Mr. Yoshimura uses a Japanese watering can to moisten the branches and soil of an 80-year-old, newly transplanted Zelkova tree

WORTH READING

A Supplementary List of Significant Articles Published During 1958

An Amateur Plants Fern Spores, by Kathryn Boydston. *American Fern Journal,* January-March. Complete guide to raising ferns from spores.

Chinese Gardens, by Beverly Kling Mohlenbrock. *Missouri Botanical Garden Bulletin,* June. Historical and present-day data on Chinese gardens and their design.

Composting Under Plastic Covers, by Adrienne Bond. *Organic Gardening,* Feb. An amateur gardener's experience.

Perennial Forcing, by Herbert C. Bardes. *New York Times,* Sept. 14. How to force herbaceous perennials indoors.

Bark Culture from A to Z, by L. F. Hawkinson. *American Orchid Society Bulletin,* Sept. How to grow orchids potted in fir bark.

Freezing Persimmons, by W. H. Hodge. *The National Horticultural Magazine,* Oct. How to quick-freeze persimmons.

The Curious World of Plant Galls, by Richard B. Fischer. *Audubon Magazine,* Nov.-Dec. The cause of galls. Illus.

Iris Troubles, by H. N. Metcalf and H. S. MacWithey, Jr. *Flower & Garden Magazine,* Aug. The cause and cure of five major iris diseases.

A Dwarf Form of Eastern White Pine, by Henry H. Chisman and Nicholas Lylo. *Journal of Forestry,* Feb. A study of the natural occurrence of dwarf pines.

An Insect and a Plant, by Stanley D. Beck. *Scientific American,* May. Studies of how the corn borer adapts to its host, the corn plant.

Richard B. Fischer

Oak galls the size of ping pong balls contain wasps' cells suspended inside. From *Audubon Magazine,* Nov-Dec., 1958

White House Trees, by Virginia Burgess Warren. *American Forests,* March. Complete list and keyed map of trees on the White House grounds.

Abscission, by Robert M. Muir and Robert E. Yager. *Natural History,* Nov. How plants shed their leaves and useless parts.

Creeping Treelessness, by Paul Tritenbach. *Parks & Recreation,* Dec. How one city went to work to bring beauty back.

Japan's Family Gardens. *Sunset,* March. A 14-page, profusely illustrated feature on small gardens in Japan; their relationship to the house; the use of plants, fences, hedges, stones, and water.

The Silver Apricot, by H. L. Li. *Frontiers,* Feb. A historical article about the ginkgo tree.

What Makes the Prize Winning Vegetable? by Henry G. Wendler. *Horticulture,* Oct. How to appraise the exhibition qualities of vegetables.

Cactus Apples for Market, by Gordon L' Allemand. *Cactus and Succulent Journal,* July-August. How opuntia cactus fruit is grown and harvested for market in California.

A World of Magic in Your Window Box, by Beverly Nichols. *Popular Gardening,* June. An English writer offers novel suggestions for planting boxes.

25 Good Plants for the Lifetime Landscape. *House & Garden,* Feb. Trees, shrubs, vines and ground covers of special value. Illus.

Seaweed—Tons of Free Fertilizer, by Anne G. Whitaker. *Flower Grower,* Aug. How to gather, compost and use seaweed for soil improvement.

How to Be Your Own Landscape Architect, by Theodore A. Weston. *American Home.* Part I, planning the foundation planting, in February issue; Part II, adding flowers for summer, May issue. Colored cut-outs, graded by size and color, and plant lists given, for do-it-yourself landscape planning.

Carnations Outdoors, by Carolyn S. Langdon. *Popular Gardening,* April. Methods of growing large carnations in the garden.

Selected Bulletins

Insect Pests of Ornamental Plants, by L. C. Kuitert. Bulletin 595. Agricultural Experiment Station, Gainesville, Fla. 52 pp. illus.

Common garden pests in the Florida area, and their control.

Miscellaneous Tropical and Subtropical Florida Fruits. Bulletin 156A. Agricultural Extension Service, Gainesville, Fla. 116 pp. illus.

The less common fruits, which will grow in Florida; their characteristics, value, culture.

Hibiscus in Florida, by R. D. Dickey. Bulletin 168. Agricultural Extension Service, Gainesville, Fla. 32 pp. illus.

Varieties of hibiscus that will grow in Florida; their culture, propagation, landscape use.

Horticulture on Postage Stamps. Sept. 19, 1958, Arnoldia. Arnold Arboretum, Jamaica Plain 30, Mass. 12 pp. illus. 50 cents.

This bulletin is restricted to stamps which pay tribute to famous botanists, botanical events and those which deal with ornamental horticulture.

The Shrub Altheas. Oct. 24, 1958, Arnoldia. Arnold Arboretum, Jamaica Plain 30, Mass. 8 pp. illus. 25 cents.

Varieties of *Hibiscus syriacus,* classified and described by color and order of bloom.

Woody Plants With Interesting Bark in Winter. Dec. 5, 1958, Arnoldia. Arnold Arboretum, Jamaica Plain 30, Mass. 8 pp. illus. 25 cents.

Trees and shrubs classified by bark color of trunks and twigs; also those which shed their bark.

Control of Slugs, Sowbugs, Centipedes, and Millipedes in the Greenhouse and Garden, by John C. Schread. Circular 203. Connecticut Agricultural Experiment Station, New Haven. 8 pp.

Mushroom Collecting for Beginners, by J. Walton Groves. Publication 861. Canada Department of Agriculture, Ottawa, Ont. 30 pp.

An illustrated guide to 17 common mushrooms, both edible and poisonous.

Illinois Trees and Shrubs: Their Insect Enemies, by L. L. English. Circular 47, Illinois Natural History Survey, Urbana, Ill. 92 pp. 25 cents.

Fully illustrated handbook of pests of woody plants and their control.

Propagation of Temperate-Zone Fruit Plants, by C. J. Hansen and H. T. Hartmann. Circular 471, Agricultural Publications, University of California, Berkeley 4. 52 pp. illus.

All methods used to propagate 15 kinds of fruits, especially those grown in warmer climates, are described and pictured.

Controlling Brush, Stumps, and Small Trees With Chemicals, by D. R. Peterson and K. P. Buchholtz. Circular 564. University of Wisconsin, Madison 6. 8 pp.

Slugs and Snails in New York Greenhouses, by Edward J. Karlin and John A. Naegele. Bulletin 1004. Cornell University, Ithaca, N. Y. 16 pp. illus. 5 cents to non-residents of New York State.

How to identify these pests and control them.

Grafting Fruit Trees, by T. S. Weir. Extension Bulletin 273. University of Minnesota, St. Paul 1. 16 pp. illus.

Grafting and Budding Fruit Trees, by E. J. Rasmussen and W. W. Smith. Extension Bulletin 145. University of New Hampshire, Durham. 20 pp. illus.

Maples Cultivated in the United States and Canada, by Brian O. Mulligan. Published by the American Association of Botanical Gardens and Arboretums, Box 216, Lima, Pa. 56 pp.

A complete check list of maples, keyed to include botanical gardens and arboreta where they are growing, and botanical data. An excellent article on propagating maples is contributed by Roger G. Coggeshall.

Plants for Informal Screen, Barrier or Boundary Plantings. Bulletin, October, 1958. The Morton Arboretum, Lisle, Ill. 6 pp. 10 cents.

Plants are grouped and described by height, width; trees, shrubs; deciduous, evergreen.

Landscape Paving for the Home Grounds, by Harold Breen. Michigan State University, East Lansing. 24 pp. illus.

Construction pointers on some of the more important paving materials for walks, terraces, driveways and play areas.

Irises for Home and Garden, by L. A. Dougherty. Extension Circular 347, University of New Hampshire, Durham. 8 pp.

A guide to selected, moderately priced iris for the garden.

Soil Sterilization Methods for the Indoor Gardener, by G. M. Fosler. Circular 793. University of Illinois, Urbana. 8 pp.

Materials and methods to use for sterilizing small amounts of soil.

An Easy Method for Germinating Flower Seeds, by G. M. Fosler. Circular 796. University of Illinois, Urbana. 12 pp. illus.

Step by step seed sowing methods to use indoors.

Flowering Gift Plants, Their Care and How to Rebloom Them, by G. M. Fosler. Circular 801. University of Illinois, Urbana. 56 pp. illus. 15 cents for non-residents of state.

The year-around care of 25 kinds of florist gift plants most likely to succeed.

Controlling Insects and Diseases on Ornamental Trees. Extension Bulletin 269. Michigan State University, East Lansing. 38 pp.

Trees are listed alphabetically, with common pests and controls under each. Spray schedules are timed for latitude of Michigan.

The Woody Plants of New Hampshire, by Albion R. Hodgdon and Frederic L. Steele. Station Bulletin 447. University of New Hampshire, Durham. 60 pp. no illus.

A botanical guide to all the woody perennial plants occurring naturally in New Hampshire, including exotic plants which have escaped, with notes on habitat and range.

Outstanding Garden Books of the Year

A Joy of Gardening, by V. Sackville-West. Harper & Bros., N. Y. 210 pp. $3.50.

Selected essays, written with style and imagination which, though reflecting an English viewpoint, have been chosen with special regard for American conditions. An inspiring book.

Hawaiian Flowers & Flowering Trees, by Loraine E. Kuck and Richard C. Tongg. Charles E. Tuttle Co., Rutland, Vt. 158 pp. $7.50.

More than 140 tropical and semitropical Hawaiian flowers and flowering trees all illustrated in full color, with detailed descriptive text.

Plants of Woodland and Wayside, by Su Zan Noguchi Swain. Doubleday & Co., N. Y. 57 pp. $2.95.

This book is designed to introduce beginners to the fascinating world of plants. Primarily a children's book, illustrated throughout with color drawings, mostly of native plants.

Enjoying America's Gardens, by Joan Parry Dutton. Reynal & Co., N. Y. 312 pp. $5.00.

This book is an enchanting account of an Englishwoman's visits to outstanding American gardens, both private and public, from coast to coast.

Garden Plants in Color, edited by Henry T. Skinner. Published by Sweeney, Krist & Dimm, Portland, Ore. Either loose-leaf or board cover editions, $42.50.

Each of seven sections of this portfolio-size book has introductory text. The balance contains 438 beautiful color engravings, captioned, of trees and deciduous shrubs, broadleaved evergreens, azaleas, camellias, rhododendrons, coniferous evergreens, and vines and ground-covers.

Colour in the Winter Garden, by Graham Stuart Thomas. Charles T. Branford Co., Newton Centre, Mass. 220 pp. $6.50.

Although this book is from England, American readers can gain knowledge and inspiration from it. Eight beautiful full-page water-color reproductions.

Flowering Stones and Mid-Day Flowers, by Dr. G. Schwantes. John de Graff, Inc., N. Y. 420 pp. 105 illus. $25.00.

A comprehensive survey of mesembryanthemums, based on an exhaustive study of these curious plants, their botanical relationship and their culture.

Flower Chronicles, by Buckner Hollingsworth. Rutgers University Press, New Brunswick, N. J. 302 pp. $5.00.

This book, based on extensive research, gives the histories of our most familiar garden flowers set against the backdrop of human history.

The Mushroom Hunter's Field Guide, by Alexander H. Smith. The University of Michigan Press, Ann Arbor. 198 pp. $4.95.

A guide to 120 kinds of edible and poisonous wild mushrooms, illustrated with 155 photographs, and keyed for identification.

Exotica; Pictorial Cyclopedia of Indoor Plants, by Alfred Byrd Graf. Published by the Roehrs Co., Rutherford, N. J. 642 pp. $17.50.

This monumental book is the result of years of labor, world-wide travel, and endless research, for the purpose of putting between covers a pictorial record of tropical and semi-tropical plants, suitable for indoor culture. From a vast file of 35,000 photographs, Mr. Graf has selected 4,000 which comprise the main part of this book. The plants are grouped by families, of which about 120 are represented. For the most part, entire plants are pictured. Descriptions of the many hundreds of species and varieties pictured follow in the same order in the back of the book.

Short chapters on such practical matters as use of plants in the home, propagation, light requirement, preface the dictionary section. There is an exhaustive index to common names, and a most thorough chapter on parts of the world where the plants grow naturally.

Since this book is written from the viewpoint of a northern plantsman, the plants are presented as indoor plants, whereas in tropical areas, the wealth of material revealed in this book could be grown in gardens.

500 Answers to Your Florida Garden Questions, by Herbert S. Wolfe, John V. Watkins and Thomas B. Mack. University of Florida Press, Gainesville. Nov., 1957. 124 pp. $2.75.

How to select, plant and care for plants in Florida. Arranged in question and answer style. Indexed.

How to Have Good Gardens in the Sunshine States, by George W. Kelly. Published by the author, Littleton, Colo. 312 pp. $3.25.

A first class guide to choosing plants for, and meeting the problems of, gardens in the semi-arid areas of the Western United States.

The Changing Face of New England, by Betty Flanders Thomson. Macmillan, N. Y. 189 pp. $3.75.

A vivid portrait of the forests, farmlands, mountains and landscape of New England, their history, and how they have been influenced by man's activities.

Grounds Maintenance Handbook, by Herbert S. Conover. F. W. Dodge Corp., N. Y. 500 pp. $10.75.

Whereas this book is of special value to those who design and maintain public or larger properties, it is a most comprehensive guide to all phases of the construction, planting and caring for landscaped areas.

Land. The Yearbook of Agriculture, 1958. Supt. of Documents, Washington, D. C. 605 pp. $2.25. A complete survey of all our land areas, their use and conservation.

Trees and Shrubs

The Azalea Book, by Frederic P. Lee. D. Van Nostrand Co., Princeton, N. J. 324 pp. $8.95.

This extremely comprehensive book is intended for serious amateur gardeners seeking information on all phases of azalea culture, the historical background of different groups and hybrids, and descriptive lists of varieties totaling about 4,000.

The Tree Identification Book, by George W. D. Symonds. M. Barrows & Co., N. Y. 134 pp. $10.00.

By means of a unique pictorial key system, over 130 different trees may be identified by their leaves, flowers, fruit, buds, bark and shape. Over 1,500 pictures, many showing the subject life size, make tree identification easy. Page size 8½ by 11 inches.

Camellia Culture, *edited* by E. C. Tourje. Macmillan Co., N. Y. 484 pp. $11.50.

This is undoubtedly the most complete, up-to-date manual on all phases of growing and caring for camellias. Fifty-five leading experts collaborated in preparing the text. The scope of this book ranges from the use of camellias in landscape design to the use of ionizing radiation in plant breeding. This book was produced by the Southern California Camellia Society.

Evergreen and Flowering Shrubs for Your Home, by Katharine M-P. Cloud. Greenberg, N. Y. 256 pp. $4.95.

Most of this book is devoted to descriptive lists of woody plants and suggestions for their use in the home landscape. The 90 photographs illustrate good ways to use plants.

The Trees on Your Street, by Desmond Muirhead. Portland (Ore.) General Electric Co. 36 pp. $2.00.

The planning of street tree plantings, and selection of varieties, is exceptionally well presented with sketches and photographs, many in color.

What Flowering Tree Is That?, by Edwin A. Menninger. Published by the author, Stuart, Fla. 183 pp. $4.00 in cloth.

A handbook of tropical flowering trees, arranged alphabetically by families. Well illustrated.

Flower Arrangement and Indoor Gardening

The Art of Flower and Foliage Arrangement, by Anna Hong Rutt. Macmillan, N.Y. 248 pp. $5.95.

This is a serious text, which approaches flower arrangement as an art. The book is divided into eight parts. In each one, a major subject is analyzed, including the basic principles, art elements, themes, types of arrangement, the mechanics of arranging, and exhibiting and judging.

Symbolism in Flower Arrangement, by Ervin S. Ferry. Macmillan, N. Y. 150 pp. $4.95.

Based on 20 years of study, the author explains the symbolism of flowers, Japanese arrangements, and accessories used in arrangements. A unique book.

Design and Depth in Flower Arrangement, by Emma Hodkinson Cyphers. Hearthside Press, N. Y. 118 pp. $3.95.

The emphasis in this book is on adding a third dimensional quality to arrangements—a sculptural quality. Special attention is given to space as a part of design. Many halftone and line drawings supplement the text.

Flower Show Ribbon-Winning Arrangements, by Mrs. Raymond Russ Stoltz. Charles Scribner's Sons, N. Y. 148 pp. $5.95.

Sixty-seven prize arrangements are illustrated, 12 in full color, with explanatory text. The emphasis is on interpretation of themes.

Dried Flowers with a Fresh Look, by Eleanor Reed Bolton. D. Van Nostrand Co., Princeton, N. J. 210 pp. $6.95.

This book reveals how to dry and preserve flowers so that they look fresh, and illustrates in color how to arrange them.

The Complete Book of Flowers and Plants for Interior Decoration, by Esther Wheeler and Anabel Combs Lasker. Hearthside Press, N. Y. 190 pp. $7.95. Page size 8½ by 11 inches.

An elegantly illustrated book on the craft and plant materials used in tasteful home decoration. There is a section on harmonizing flowers and containers with period styles.

The Art of Drying Plants and Flowers, by Mabel Squires. M. Barrows & Co., N. Y. 258 pp. $4.50.

One who has made a hobby of drying plant materials tells which plants dry well and where to find them; tested drying methods; and the decorative uses for dried plants, illustrated.

New Ways With Dried Flowers, by Ruth Gannon. The Studio Publications, N. Y. 136 pp. $4.75.

Methods of gathering and drying all kinds of garden flowers, woody material and wild flowers are given. Many arrangements are pictured, in color and black and white. There's a chapter on designing pictures, screens and lampshades with dried flowers.

Complete Book of House Plants, by Andree Vilas Grabe. Random House, N. Y. 128 pp. $2.95.

An elementary primer, the first section of which outlines house plant requirements; the second section is an illustrated dictionary of 275 plants and their individual requirements.

An Easy Guide to House Plants, by Arno and Irene Nehrling. Hearthside Press, N. Y. 100 pp. $2.95.

A concise guide to the care of indoor plants, selecting them for special purposes, and an alphabetical dictionary of plants.

The Amaryllis Manual, by Hamilton P. Traub. Macmillan, N. Y. 338 pp. $7.50.

This comprehensive book, beyond supplying complete information on the culture, ornamental uses and history of all species of amaryllis, includes chapters on breeding, commercial propagation, amaryllis shows, and a key to all known species.

Garden in Your House, by Ernesta Drinker Ballard. Harper & Bros., N. Y. 256 pp. $5.95.

This book has three parts: a thorough discussion of house plant care, summer and winter; illustrated window arrangements, with comment and plant lists; and a lengthy alphabetical dictionary of house plants with comments and cultural notes. Fully illustrated.

1001 African Violet Questions Answered, edited by Helen Van Pelt Wilson. D. Van Nostrand Co., Princeton, N. J. 372 pp. $4.95.

Twelve experienced growers supplied the answers to questions which are grouped by subjects, including propagation, culture, potting, hybridizing and exhibiting.

Indoor Gardening, by the Editors of Flower Grower. Fawcett Publications, N. Y. 144 pp. $.75.

How to grow all kinds of plants indoors. Illus.

Window Sill Gardening, by James Underwood Crockett. Doubleday & Co., N. Y. 120 pp. $2.95.

An easy-to-read guide to growing house and florists' plants indoors.

The Complete Guide to Indoor Plants, by Eigil Kiaer. Crown Publishers, Inc., N. Y. 186 pp. $3.50.

The first section of this book contains accurate color reproductions of 372 kinds of plants that can be grown indoors. In the second section, each plant is described, with cultural data.

Gardening, Forcing, Conditioning and Drying for Flower Arrangements, by Arno and Irene Nehrling. Hearthside Press, N. Y. 228 pp. $3.95.

A review of woody and herbaceous plants and flowers that are of special value in flower arrangements, and ways to use them in the home landscape.

Landscaping and Garden Techniques

Gardens of Japan, by Tetsuro Yoshida. Frederick A. Praeger, Inc., N. Y. 188 pp. $12.50.

This book skillfully interprets, for Western World readers, the basic features of Japanese gardens, such as integration of house and garden; the atmosphere of seclusion in a small space; the elements of mystery and surprise; the use of basic elements, including trees, shrubs, stone, water, paving, paths, moss and enclosures. There are over 100 full-page illustrations.

The Art of the Japanese Garden, by Tatsuo Ishimoto. Crown Publishers, N. Y. 128 pp. $2.95.

This is a source book of ideas for American gardens based on the Japanese family garden. Most of the 200 illustrations are of garden details, useful in developing small plots.

Sunset Ideas for Color in Your Garden. Lane Publishing Co., Menlo Park, Calif. 80 pp. $1.50. Page size 8 by 11 inches.

By means of scores of color and black and white photographs and sketches, dozens of ways to introduce color into the garden through the use of annuals, bulbs, herbaceous plants, flowering trees and shrubs are presented. Ideas for small properties.

Creative Gardens, by James C. Rose. Reinhold Publishing Corp., N. Y. 208 pp. $10.00.

This book is concerned with gardens designed as outdoor living space, in the modern manner. Its 9 by 12-inch pages carry lavish illustrations, in color and black and white, of gardens and design details. An inspiring book.

The House Beautiful Book of Gardens and Outdoor Living, by Joseph E. Howland. Doubleday & Co., N. Y. 376 pp. $10.00.

This book is described as the picture-story of the modern American garden, which serves as a background for gracious living. Dozens of topics are treated, including gardening in pots, night lighting, climate control, play areas for children and gardening on steep slopes. The bulk of the book is illustrations (with captions)—906 in all, of which 106 are in full color. Page size is 9 by 12½ inches.

Gardens & Grounds That Take Care of Themselves, by Amelia Leavitt Hill. Prentice-Hall, Englewood Cliffs, N. J. 282 pp. $3.95.

An elementary guide to home grounds design, and suitable plants to use.

Landscaping the Small Home, by the Editors of Flower Grower. Fawcett Publications, N. Y. 144 pp. $.75.

How to design all parts of the grounds; how to develop the different areas; and the plants to use. Illus.

Pruning Without Pain, by O. B. Howell. Montana State University Press, Missoula, Mont. 40 pp. $1.00.

This booklet explains why one should prune, and when and how to prune various kinds of plants.

Pruning Made Easy, by Edwin F. Steffek. Henry Holt & Co., N. Y. 120 pp. $2.95.

A complete, easy-to-follow book on pruning all kinds of plants. Specific data on scores of different plants is included.

Garden Flowers and Plants

Modern Roses V. Published by the J. Horace McFarland Co., Harrisburg, Penna. 472 pp. $10.75.

This is the fifth edition of an alphabetical descriptive list of all roses in commerce or of historical or botanical importance. Basic data is given on 7,562 varieties and 333 species.

The Lily Yearbook. Published by the North American Lily Society, Geneva, N. Y. 124 pp. $4.00 with membership.

Thirty-five assorted articles of special interest to lily fanciers, on such subjects as propagating bulbs by scaling, lily breeding, rare species, new hybrids, reviews of lily society events.

American Rose Annual, 1958. Published by the American Rose Society, Columbus 14, Ohio. 266 pp. $5.50 with membership.

The first hundred pages of this annual are devoted to 36 assorted articles on such matters as rose-growing experiences in various parts of the country and pest control. Nearly all of the remaining pages are filled with performance reports on scores of recently introduced varieties, under the title "Proof of the Pudding."

The Rockwells' Complete Book of Roses, by F. F. Rockwell and Esther C. Grayson. Doubleday & Co., N. Y. 332 pp. $5.95.

A comprehensive, practical book, for beginners and experienced gardeners, on how to grow and enjoy garden roses. Fully illustrated.

Small Fruits for Your Home Garden, by J. Harold Clarke. Doubleday & Co., N. Y. 372 pp. $4.95.

This book deals with all aspects of growing small fruit, including the latest information on chemical weed control, fruit breeding, and growing fruit for profit.

Beginners Handbook on Chrysanthemum Culture. 1958 Revised edition. 64 pp. $1.00.

From the National Chrysanthemum Society's secretary, Miss Dorothy P. Tuthill, 345 Milton Rd., Rye, N. Y. A guide to growing the best chrysanthemums.

The Gladiolus, published by the New England Gladiolus Society, Boston 15, Mass. 260 pp. $3.00 with membership.

Reports on chemical weed control and hybridizing are featured among over 30 articles of wide interest to gladiolus specialists.

Romance in the Garden, by John H. Tobe. George J. McLeod, Toronto. 368 pp. $5.00.

A collection of several hundred highly personalized anecdotes and observations on gardening and related subjects.

Garden Pools, Water-lilies, and Goldfish, by G. L. Thomas, Jr. D. Van Nostrand Co., Princeton, N. J. 222 pp. $5.95.

This much-needed book contains detailed instructions on placing, building and planting garden pools with water-llies and aquatics, and also selecting and caring for goldfish (including the best species and varieties) in pools and aquariums.

The Guide to Garden Flowers, by Norman Taylor. Houghton Mifflin Co., Boston. 316 pp. $4.95.

A fine volume on the identification and culture of 412 species of garden flowers, with 324 illustrated in full color. Complete data on each flower is given.

Flowers of the World in Full Color, by Robert S. Lemon and Charles L. Sherman. Hanover House, N. Y. 280 pp. $7.50. 620 illus. in full color.

Flowers of the Old World and the New World are grouped according to their origin in the temperate or tropical zones, with running text about their origin, history, and character. A most colorful book.

The Hemerocallis Journal. 1958 Yearbook Issue. American Hemerocallis Society, 416 Arter Ave., Topeka, Kan. 216 pp. $3.50 with membership.

Forty-six articles on daylily culture, variety notes, society activities.

American Daffodil Yearbook. American Daffodil Society, Inc. Miss Estelle Sharp, sec., Berwyn, Penna. 106 pp. $1.25.

Twenty-five articles of special interest to daffodil fanciers.

Flowers Native to the Deep South, by Caroline Dorman. Claitor's Book Store, Baton Rouge, La. 176 pp. 33 color plates; 102 line drawings. $7.50.

An excellent guide to southern native, herbaceous plants which have some special beauty, arranged by plant families.

The Directory of American Horticulture for 1958. The American Horticultural Council, The Arnold Arboretum, Jamaica Plains 30, Mass. 72 pp. $1.50.

A directory to horticultural organizations, arboretums, botanical gardens, publications, garden centers, colleges and other horticultural centers, mostly in North America.

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